

COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

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New York, November, 1934



Coal Speaks

WHILE other industries still debate what should be done after the expiration of NIRA next June, the bituminous mining industry, speaking through the National Coal Association, has reached a definite decision. That decision calls for a two-year extension of code control over wages, hours and minimum prices, and the enactment of the necessary legislation to give statutory effect to such extension until a permanent basis for sound recovery can be established. This sound recovery, it is declared, must rest upon government control of overexpansion of the productive facilities of the industry.

The implications of this final plank in the new platform of the bituminous industry are highly significant. Extension of the code provisions is readily justified on the ground that the emergency which brought them into being still exists. The proposed control of overexpansion carries no "emergency" tag and must be construed as a direct abandonment of the industry's traditional opposition to permanent government supervision. Cold realities and a keen desire to forestall a return to the chaos of recent years have triumphed over deep-seated predilections for untrammelled freedom of action.

Organized Research

COORDINATED RESEARCH was advanced another step last month with the election of the stockholders' group of directors for Bituminous Coal Research, Inc. But the financial support for carrying on the actual work which

must soon be undertaken leaves much to be desired. Subscriptions approximating only \$100,000 hardly reflect credit upon an industry which so badly needs the aid of research to hold present markets and to explore the possibilities of new uses for its products. When many individual companies in other industries spend more than that sum every year upon research, bituminous coal cannot afford to follow a niggardly policy in developing this vital defense against future losses.

Break Lines

PILLAR DRAWING was so long delayed in the anthracite region that the art was almost forgotten. For safety and economy, break lines must be continuous, straight and at about 45 deg. to the direction in which the chambers are driven, and all the coal must be removed as the work progresses or the weight imposed on the pillars will be unequal and the fractures desired will not be obtained. In some instances, little effort appears to have been made to conform to these requirements.

When pillars are split, the roadway to be constructed has to be about twice as wide as that needed for the skipping of the pillar, and the cost of driving the roadway is larger. The pillars also are weakened by the larger quantity of coal removed, by the dividing of the pillar into two weak halves and by the use of more explosives. Moreover, the cars to be loaded in the more level places have to be set too close to the impending break line. These considerations in such places will often more than overcome the advantage of the

nearness of the coal to the car being loaded and the rapidity with which the removal of the pillar is effected when once the split is completed.

When the skip road is made on the side of the pillar nearest the break line, the men have to work still closer to the line of fracture, and if they should happen to be on the far side of the pillar a sudden break may cut off their escape to the skip road, and the gob piled in the adjacent room may shut off escape in that direction. Skip roads should be made on the side of the pillar away from the intended break line. Then ample space will be available between the fracture line and the near rib of the pillar to afford space for a mine car without much risk of a fall. Of course, reliance may be placed on close and heavy timbering, but that is expensive, may be ineffective and will delay the desired fall, which for safety and economy should follow closely the removal of coal from the pillar.

Straight, continuous break lines and skips made on the side of the pillar away from the break line will be found to give the safest and most economical extraction. The practice of marking the rib with numbered cuts so as to indicate successive break lines will result in avoidance of accident, economy of timber and increased percentage extraction.

Nystagmus

THAT clonic spasm of the eyeball designated "nystagmus" is not likely to invade America for some years. Years ago, anthracite mines, being gassy, used closed-flame safety lamps and were accordingly very poorly lighted, yet there was no nystagmus. British mines in earlier years knew nothing of the disease, though equally ill-lighted; today, with better lighting, nystagmus is rife. Metal mines in America for years used only flickering candles set far from the work and had no nystagmus. Arguing from these incomplete premises, nystagmus comes with, and therefore from, more effectual lighting, which obviously is a false conclusion, because with lighting in America today better than in Great Britain we have no nystagmus and they have a large number of cases.

All of which contradictory argument seems to suggest that nystagmus is due rather to depth and heat than to lighting conditions and

eyestrain. In the depths of the mine a parasite, bacterial or perhaps algal, may develop and cause infection. British mines appear to be more greatly infective than ours, and it is common knowledge that the hookworm ravaged European mines and never invaded our Northern workings, perhaps also not those of the South, for the prevalence of hookworm in the Southern mines probably was due to contact with the worm on the surface, where the temperature more greatly favored its development than in the cooler depths of the mines.

Loaded Dice

IN AN ATTEMPT to meet the attacks of the coal industry on the federal power program, TVA has come forward with a proposal that it join with the industry in setting up an impartial board to investigate the respective costs of coal and hydro-electric power. Natural enthusiasm over this suggestion, however, is tempered by the standards for comparison laid down in the proposal and summarized elsewhere in this issue. Some of these conditions, unfortunately, will appeal more strongly to the partisan sociologist bent on proving a case than to the independent engineer interested only in establishing the facts.

TVA, for example, would broaden the definition of the actual cost of coal to take in "social costs" and government relief expenditures in the mining areas. Such a broadening would completely alter present concepts of proper cost accounting. Moreover, even if the speculative elements involved could be accurately measured, their inclusion would distort the picture because nowhere in the TVA plan is it proposed that the power costs at government projects likewise should be increased to cover the capital destruction and unemployment threatened in the mining industry by the hydro-electric program.

That an impartial determination of the relative costs of generating electricity in the Tennessee Valley by hydro-electric power and with coal would contribute materially to clarified thinking on the subject is obvious. But, to attain this end, the figures used must be on truly comparable bases. Acceptance of the standards proposed by TVA would make such comparisons impossible and would serve only further to muddy the situation.

NEW MICHIGAN MINE

+ Of Consolidated Coal Co. Sets Goal For Low Cost and Minimum Degradation

By IVAN A. GIVEN

Assistant Editor, Coal Age

TWO NEW OPERATIONS within the past year represent Michigan's share in the comeback of the bituminous industry. One of these, the Crapo mine of the Consolidated Coal Co., with headquarters at Saginaw, has reached the stage where full-scale output of 1,000 to 1,200 tons per day is merely a matter of entry development and is featured by an underground mining plan based on wide experience with the thin seams and comparatively light cover of the Wolverine State, plus a truck-shipping tippie designed to reduce degradation and operating cost.

Crapo mine is located near New Lothrop, Shiawassee County, eighteen miles northwest of Flint, which also is the major market. The territory to be worked approximates 500 acres, estimated to contain 2,500,000 tons of Upper Verne coal with an average thickness of 40 in. and a range of from 30 to 54 in. Average depth of cover is 175 ft., and, except for 70 to 75 ft. of clay, it consists of sandstones and shales. Immediately overlying the seam is a

stratum of dark gray shale which, due to a tendency to slack when broken or disturbed, requires careful timbering. Beneath the seam is a stratum of "black jack," or black slate, and the seam itself is free of bands or partings. In certain sections, however, a rash appears in the top of the coal, this rash consisting of boney material heavily impregnated with pyrites. It is picked out and discarded by the miner.

The coal is reached by a two-compartment shaft 192 ft. deep and timbered solid with long-leaf yellow pine. Inside dimensions of the shaft are $7\frac{1}{2} \times 16$ ft. A second, or air, shaft, also timbered solid and fitted with emergency stairs, is located 375 ft. away. Depth is 185 ft. and inside dimensions are 6×11 ft. The hoisting shaft, also designed to handle men, machinery and materials, is fitted with an Ottumwa double cylindro-conical geared hoist with Lilly control, driven by a 150-hp., 575-r.p.m., Type MT General Electric motor, and Connelville self-dumping cages with special endgate-lifting mechanisms.

Underground operation is based on the use of main and room entries, each consisting of a pair of headings. Headings for the main entries are driven 6 ft. wide and, by lifting bottom or taking top, high enough to maintain an average height of 6 ft. over the rail and under the timbers. Headings for butt, or room, entries are driven 18 ft. wide. This allows the slate removed in making a roadway 6 ft. wide and $5\frac{1}{2}$ ft. in the clear over the rail to be gobbled on the side opposite the room necks. This method of driving gives these openings their local designation of "gob entries" and permits the disposal of much slate underground. Slate removed in driving the main entries, however, is hoisted to the surface.

With the exception of the shaft bottom, timbered with 3-piece square sets of 10x10-in. timbers, the roof on the main entries is supported by crossbars of 60- and 80-lb. rail hitched into the rib on each side and lagged over the top

Fig. 1—42 In. of Clean Seam at the Face of a Room Heading. Gob Obtained in Lifting Bottom for a 6-Ft. Roadway Is Deposited on the Bench at the Left of the Place.



Fig. 2—General View of Crapo Tippie, Showing (Left) Lump Bin and Booms and (Right) Egg Bin and Boom. Arrows Point to Flat-Belt Feeders Under Slack Bin.



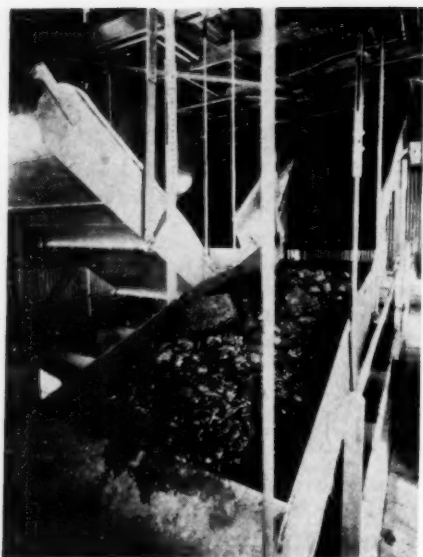


Fig. 3—Tilting Weigh Pans—A Feature of the Crapo Tipple. Drives for the Tilting Mechanism Are Located Overhead.

with 2-in. boards. Room entries are timbered with crossbars made of 8-ft. lengths of 3x8-in. tamarack planks hitched into the rib on one side and supported on a post on the bench on the other side. Two additional posts are set between the end of the crossbar and the rib on the gob side, and the space is then filled with slate. Steel-rail crossbars are set across the mouth of each room for protection.

Tracks are laid in both headings of both the main and room entries. On main entries, one track serves for the loaded trips, and is laid with 40-lb. rail. Empty tracks are laid with 30-lb. rail, and the same weight is used on room entries. Twelve-pound rail is used in rooms. Entry turnouts are laid with a minimum radius of curvature of 31 ft.; room turnouts, 15 ft. Main and room entries are tied with 4x6-in. hardwood ties 4 ft. long; rooms, 2x4-in. ties 4 ft. long. Track gage is 36 in. The loaded track at the shaft bottom is laid on a gradient of 1½ per cent down to the landing. Length is 375 ft., sufficient to accommodate 60 cars. The empty track corresponds in length and gradient.

The shaft bottom plan is shown in Fig. 4. With the exception of a small territory to the east, supplying quick coal during development, the production is hauled to the head of the loaded track west of the shaft. Coming down the loaded track, the locomotive cuts off and goes through the runaround to the other side of the shaft, where it hooks onto the empty trip, returning through the empty haulway.

Mine-car equipment consists of 400 Bethlehem all-steel lift-endgate-type cars with 12-in. Timken-bearing wheels. Capacity level full is 27.3 cu.ft., and average loading is 2,000 lb. Principal dimensions are: height above the rail,

23 in.; length, over all, 6 ft. 8 in.; inside, 6 ft.; width, over all, 3 ft. 10 in.; wheelbase, 16 in. Six-ton trolley locomotives are used in main haulage and also are employed in gathering service at the present time, cars being handled in the working places beyond the wire by the loaders. Smaller gathering locomotives will be installed later. Inasmuch, as noted above, track is laid in both headings on room entries, empty trips will be brought to the gathering locomotive on one heading, the haulage locomotive cutting off and going through a crossover to pick up the loaded trip. Pushing cars, which is general practice in Michigan, will be continued, it is expected, even after the gathering locomotives are installed.

Room entries, as indicated in Fig. 4, are turned both ways from the mains. In turn, rooms are turned at right angles from both sides of room entries. Both main and room entries are driven so that the distance from outside rib to outside rib is 50 ft. Distance from center to center of pairs of room entries is 350 ft., making the room depth 150 ft. from the heading rib to the room face. Main entries are protected by 40-ft. pillars.

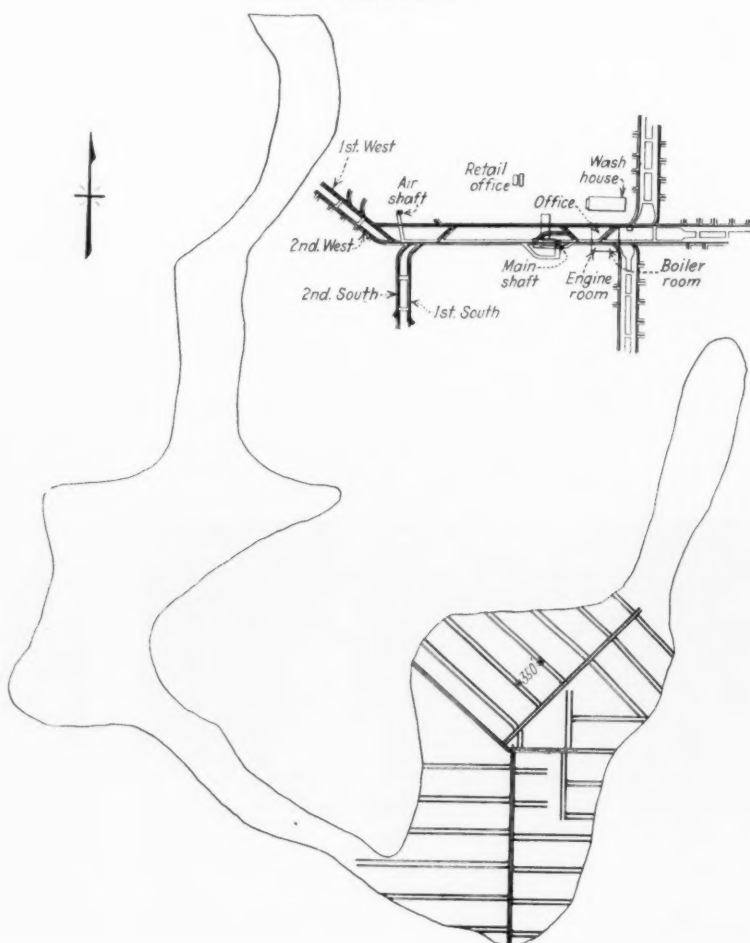
Pending sufficient experience to determine whether pillars can be extracted successfully, rooms are being driven 30

ft. wide on 40-ft. centers as the entries advance. Room necks are 10 ft. wide and widening starts on both sides 20 ft. in. A single track is laid in the center of each room, and the bottom is lifted where necessary to make a roadway 5 ft. wide and 3 ft. 9 in. to 4 ft. high. In general, individual posts, supplemented by crossbars where necessary, are used in rooms. Slate removed in making the roadways is gobbled along the rib.

If pillar-drawing proves feasible, it is planned to drive the rooms 40 ft. wide on 50-ft. centers, widening in the direction of the advance and laying two tracks. Pillaring will proceed on the advance, each pillar being removed down to the room stump as soon as the room is driven. Actual robbing will consist of making slabbing cuts 20 to 30 ft. long in the pillar, starting at the face. As the pillar width will be only 10 ft., two slabbing cuts will suffice for one section. Coal from the pillars will be loaded out on the straight track, the other track being removed before operations start. When a room entry reaches its limit, the room stumps (approximately 50 ft. thick, inasmuch as the first breakthrough is driven 60 ft. from the center of the heading) will be recovered on the retreat.

It is not expected, however, that pillar

Fig. 4—Shaft-Bottom Layout and Underground Development Plan at Crapo Mine.



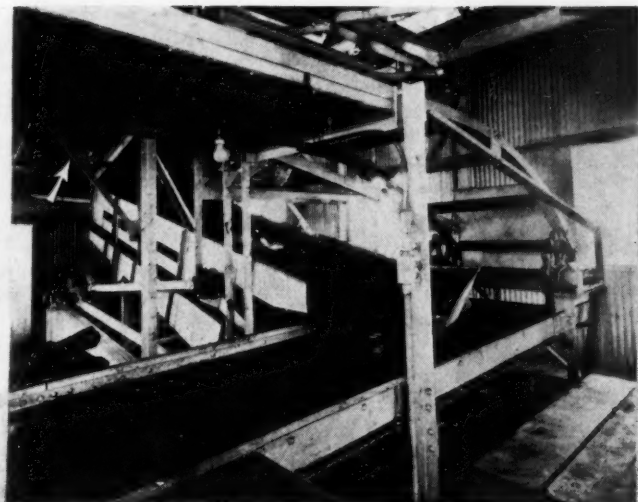


Fig. 5—Lump Discharging From Shaker Onto Picking Section of Storage Conveyor. Arrow Points to One Side of Divided Feeder. Below the Shaker Is the Slack-Receiving Extension of the Lower Deck of the Picking Table.

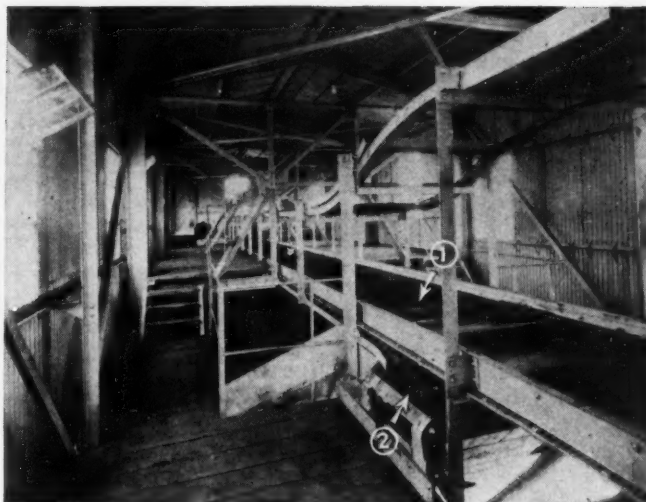


Fig. 6—Lump-Storage Conveyor Bin From a Point Near the Shaker-Screen Discharge. Arrow (1) Points to the End of the Fixed Trough of the Conveyor; Arrow (2) to the Tail Pulley of the Movable Trough.

robbing will be practiced where bottom-lifting is necessary, due to the expense of constructing an extra roadway in each room. Even where pillars are not drawn, it is expected that room stumps will be recovered as the final step on an entry.

Jeffrey 35B and Goodman 212AA low-vein shortwalls are used for undercutting, and the coal is drilled by hand, using post mountings. Drillholes are started far enough down from the roof to allow them to angle almost to the top at the back of the cut, and the coal is shot with duPont pellet powder. Pellet powder and dynamite are used in breaking up the slate in lifting bottom or taking down top, as the case may be, and also in driving such rock headings as the rolling nature of the coal makes necessary. All blasting is done when the men are out of the mine. When operating at rated capacity, between 150

and 175 places (rooms and headings) will be required for an output of 1,000 to 1,200 tons, and a total of 275 to 325 men will be employed.

Preparation at Crapo is distinguished by the care taken to minimize degradation, facilitate loading of trucks and reduce operating labor to a minimum. Rated capacity of the plant, designed and built by the Link-Belt Co., is 150 tons per hour. Cars are dumped automatically into chutes in the top of the tipples, the coal flowing into tilting weigh pans and the rock dropping through flygates into the 100-ton rock bin. The tilting weigh pans are primarily a Michigan development designed to reduce degradation. As shown in Fig. 3, the coal slides down the chutes into the respective pans without appreciable drop, and is checked against the curving rear ends. The action is such as to spread the feed out in a thin layer for

inspection for excessive quantities of impurities. After the weight of material in an individual pan is read on one of two Fairbanks dial scales in front of the landing, the weigh boss presses a button to start a motor and, through a gear train, tilt the pan forward so that the coal runs down one side of the divided feeder onto the shaker screen. Here again all drops are reduced to a minimum. Capacity of each weigh pan is 4,000 lb., and both are interlocked with the screen, picking table and lump storage conveyor to prevent dumping coal on the screen while it is at rest. Limit switches are provided to stop the movements of the pans automatically.

The shaker screen varies from the usual type in that it also includes the mine-run feeder. Below the screen is the picking table, with features to be taken up in succeeding paragraphs. Both the screen and the table, which recipro-

Fig. 7—Double-Drum Geared Hoist for Raising Cars Out of the 192-Ft. Shaft for Handling Coal, Men and Materials.

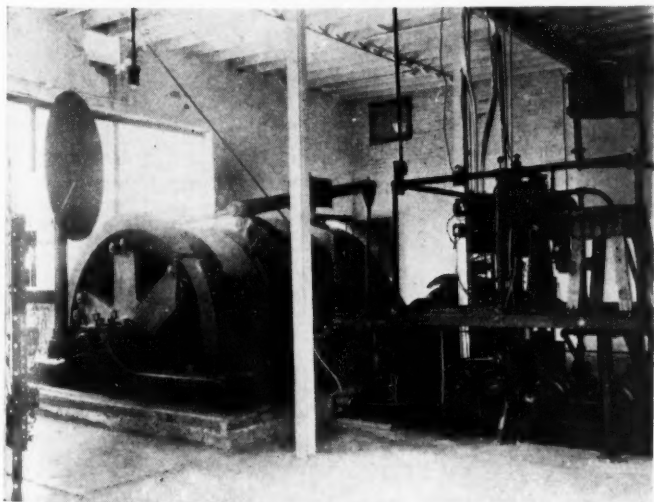
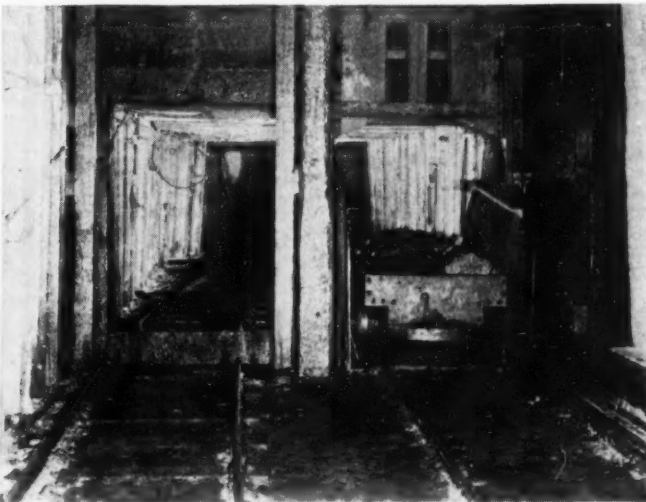


Fig. 8—Bottom Landing of the 192-Ft. Solidly Timbered Hoisting Shaft. A Loaded Car Is Shown on the Right-Hand Cage.



cate in opposite directions, are driven from a common shaft by a 25-hp. motor. The screen includes two decks with 4- and 2-in. perforations, respectively, for making 4-in. lump, 2x4-in. egg and 2-in. slack. The lump discharges onto the 42-in.-wide 70-ft.-long chain-and-flight conveyor which delivers it to the 300-ton lump-storage bin. The first 10 ft. of the fixed trough of the conveyor is the lump picking space. The fixed trough ends at the near edge of the lump bin, and is replaced by a motor-operated movable trough, consisting of parallel chains with flat pans 6 in. wide fastened between them. While the conveyor is endless and extends entirely around the bin (see Fig. 10), only enough pans are used to extend across the top of the bin with a few feet to spare.

The movable trough is another feature designed to reduce degradation. In filling the lump bin, operations start at the end of the fixed trough and a layer of coal reaching to the top of the bin is laid down on the sloping end. Then, as loading continues, the movable trough is advanced from time to time, so that the lumps are scraped off onto the top of the coal already in the bin without appreciable fall and with a minimum of rolling. To return the trough to its original position, the motor is reversed; by operating the motor in the required direction it can be spotted at any desired intermediate point.

Egg is discharged from the lower

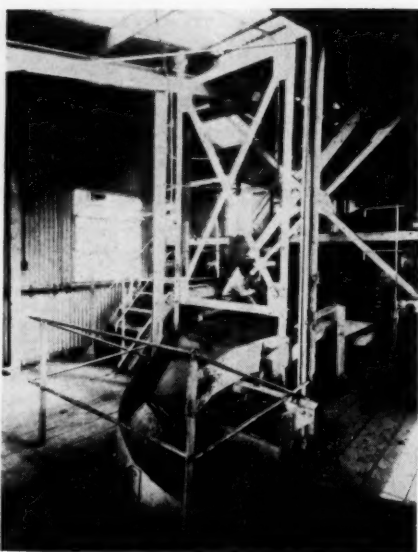


Fig. 9—Egg Picking Table Discharging Into Spiral Lowering Chute. Underneath Is the Extension of the Slack Chute to Permit Mixing.

deck of the shaker screen onto a double-deck shaking picking table, also a departure from usual design in that the slack and pickings chutes are built integrally with it. Before reaching the picking surface, however, the egg passes over a 2-ft. rescreen with 2-in. perforations, degradation dropping into the slack chute, which extends back under the shaker to receive slack passing

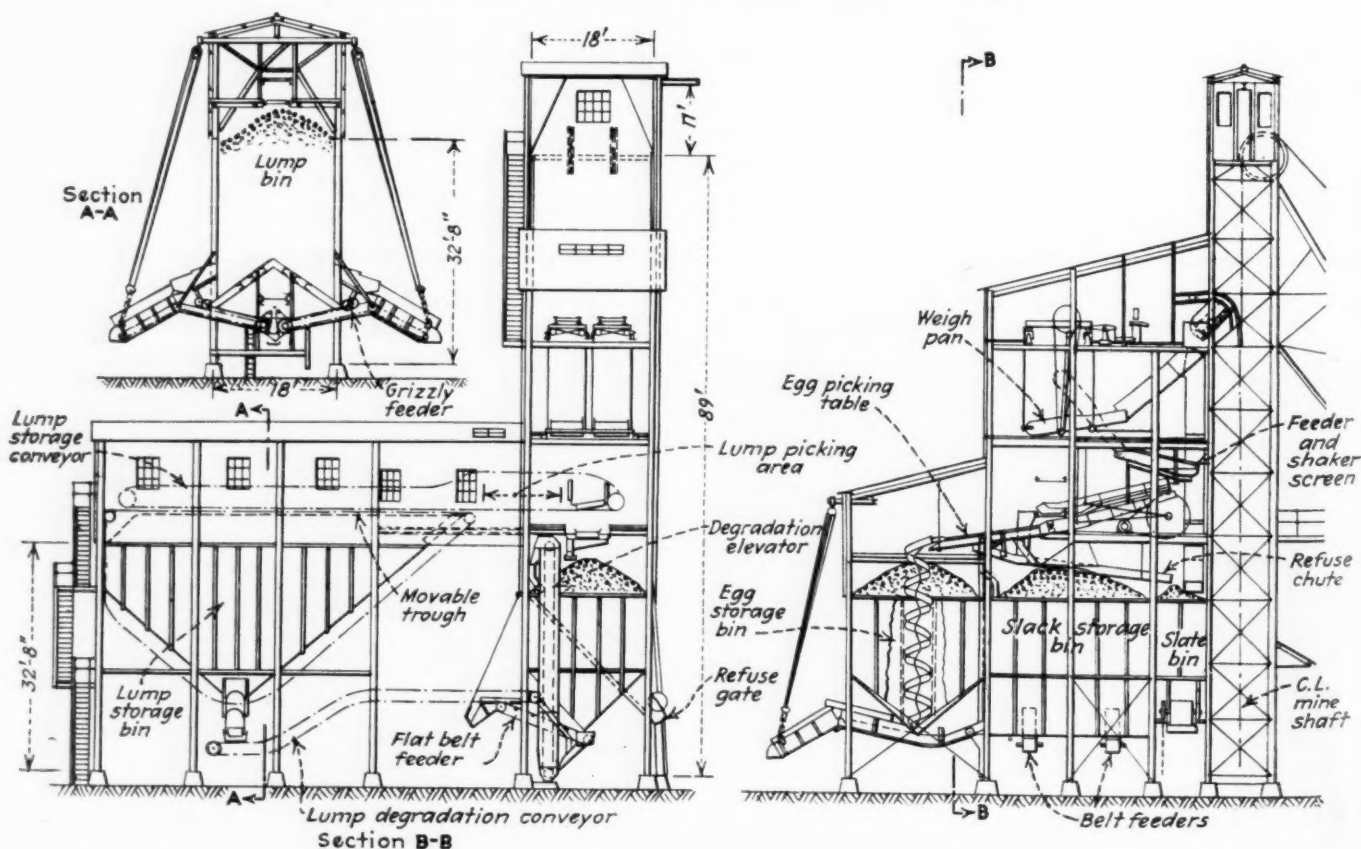
through the lower deck, and also forward over the egg bin to permit mixing when desired. Ordinarily, however, the slack is bypassed through a flygate to a secondary chute inclined in the opposite direction and delivering to the 165-ton slack bin. The egg, after passing over the picking table, is discharged onto a spiral lowering chute in the 135-ton egg bin—another feature for reducing degradation. Both lump and egg pickings drop into the shaking rock chute extending back to the rock bin.

Lump is loaded into trucks by two 36-in.-wide patented scraper-conveyor rescreening-type loading booms, one on each side of the bin (Fig. 10). Coal is fed onto each by two grizzly feeders, which perform the initial degradation separation. Near the end of each boom is a 2-ft. rescreen of the bar type with 1½-in. spacings for the final step in rescreening. Degradation is carried back on the lower runs of the booms to a small bin, from which it discharges onto a scraper-type degradation conveyor. This conveyor discharges into an elevator extending up to the slack chute.

One loading boom is provided for egg coal and, like the lump booms, it is equipped with a bar-type rescreen with 1½-in. spacings near the discharge end, degradation going back to the elevator. The grizzly feeder, however, is omitted on this boom, although an adjustable-blade-type regulator is installed to limit

(Turn to page 426)

Fig. 10—Profile Views, Crapo Tipple, Showing Arrangement of Equipment.



TWO-YEAR EXTENSION

+ Of Bituminous Code-Control Plan

Asked by National Coal Association

WITHOUT a dissenting vote and with practically no discussion, members of the National Coal Association went on record as favoring a two-year extension of the minimum price, wage- and hour-control features of the bituminous code in the closing session of the fifteenth annual convention of the organization, at the Mayflower Hotel, Washington, D. C., Oct. 27. The action taken was recommended in the report of the special legislative committee of the association pending the establishment of "some permanent basis of sound recovery" for the mining industry. Such recovery must rest upon government control of overexpansion of productive facilities.

As a result of conferences and discussions held since the appointment of the special committee, June 20, stated J. D. A. Morrow, president, Pittsburgh Coal Co., and chairman of the committee, three general conclusions had been reached:

"1. Conditions in the bituminous coal industry are sufficiently different from those in manufacturing enterprises and the industry is one of such magnitude and public importance that it needs and deserves special consideration and special legislation to deal effectively with its problems.

"2. As a permanent basis for a sound recovery in this industry, some control of overexpansion of productive facilities should be established. This can be done only by the United States Government. Since the policy of the administration with respect to control of production of natural resources has not been made public, further conferences with officials of the government are necessary on this question.

"3. The committee is unanimously of the opinion:

"(a) That the bituminous coal code has been a forward step toward stabilization and rehabilitation of the industry and has developed constructive co-operative relationships within the industry.

"(b) That the maintenance of fair minimum market prices is essential for the protection of hours of labor, rates of pay and conditions of employment set up for the industry under the provisions of the code.

"(c) That the emergency which a year ago required control of hours of labor, rates of pay and fair market prices still exists and will continue to exist until such time as control of overexpansion be established.

"Having reached these settled conclusions," continued the report, "the committee recommends to you that legislation be sought to continue those features of NRA and of the bituminous coal code necessary for these purposes

For Government Control

Abandoning its traditional—and successful—opposition to permanent government regulation, the National Coal Association, as spokesmen for the bituminous mining interests of the country, at its fifteenth annual convention in Washington last month, asked for the enactment of federal legislation to control further overexpansion of the productive facilities of the industry. Such control, it declared, was basic to a sound recovery for the coal-mining activities of the nation. Specific exemption from the provisions of the anti-trust statutes to the extent necessary to effect permanent stabilization under the supervision of an appropriate federal board also was asked.

Pending the setting up of machinery for this permanent stabilization, the industry asked emergency legislation be enacted to continue those features of NRA and of the existing bituminous coal code which provide for maintenance of fair minimum market prices, protection of hours of labor, rates of pay and conditions of employment. Such extension should continue for two years from April 1, 1935, "or until some permanent basis of sound recovery in this industry shall be established."



J. D. A. Morrow

Chairman, Special Legislative Committee
National Coal Association

for a period of two years from April 1, 1935, or until some permanent basis of sound recovery in this industry shall be established. Such legislation should include specific exemptions from the prohibitions of the anti-trust acts, to be administered under the supervision of an appropriate federal board, as may be required to make such stabilization provisions effective.

"This committee is not ready at this time to present in detail a definite recommendation of the form such legislation should take. You will all readily realize that the problems of this industry are not the same in all districts and that the interests of others than those engaged in the production of bituminous coal must be considered. This committee hopes to evolve a comprehensive plan which will meet the essential requirements of the industry, of labor, of the consumer, and of the general public as represented by the federal government, but has not yet had time to complete this task.

"The subject of what legislation shall follow NRA is receiving much attention both from governmental authorities and non-governmental organizations. This committee considers it of the utmost importance that the coal industry should also have representatives considering this subject and keeping in close touch with all developments. It believes that the National Coal Association is the proper body to sponsor such representation and, therefore, recommends that this committee be continued or a like committee be appointed to take up and carry forward its work."

Prior to formulating its report and conclusions the committee held seventeen meetings at New York, Chicago

and Washington and discussed the question of future legislation with representative operators from all parts of the country, with the United Mine Workers, NRA, and the National Emergency Council. Arrangements have been made, said the committee, for further conferences with spokesmen for the administration and other interested parties. Various suggestions and counter-suggestions were freely made at these conferences "in the effort to find practical and sound solutions to the many complicated and difficult problems involved." Courtesy to the government participants in these meetings, it was explained, "precludes the committee from disclosing to you here publicly the extent of all of those discussions in detail."

Members of the special committee, in addition to Chairman Morrow, are: J. D. Francis, president, Island Creek Coal Co., Huntington, W. Va.; Charles O'Neill, vice-president, Peale, Peacock & Kerr, New York City; W. L. Robison, president, Youghiogeny & Ohio Coal Co., Cleveland, Ohio; Grant Stauffer, president, Sinclair Coal Co., Kansas City, Mo.; William J. Jenkins, president, Consolidated Coal Co. of St. Louis, St. Louis, Mo.; and O. L. Alexander, president, Pocahontas Fuel Co., New York City. Charles E. Bockus, president, Clinchfield Coal Corporation, New York City, and retiring president

of the National Coal Association, served as ex-officio member of the committee.

The committee, said Mr. Morrow in submitting the formal report, would be glad to have any comments and would welcome any concrete, detailed suggestions. The objective of the committee is to arrive at a general plan which will work out to the greatest good of the greatest number in the industry. Moving the adoption of the report, Mr. Bockus urged that a committee to consider the question in all its ramifications should be continued. The committee, stated Mr. Morrow, hopes to be able to complete its labors by Dec. 15.

R. H. Sherwood, president, Central Indiana Coal Co., Indianapolis, Ind., expressed the opinion that a two-year moratorium on new production would be difficult to enforce and, moreover, would be of doubtful legality. Mr. Morrow answered that the committee was not at liberty at this time to disclose any specific suggestions, but did feel that it had a plan which would be both legal and workable. The committee report, he pointed out, did not recommend a two-year moratorium on new production but only some control over overexpansion. In response to a further question as to whether the committee plan covered both intrastate and interstate business, Mr. Morrow stated the committee plan would embrace all aspects of the problem.

vance in the consumption of power."

6. The report of the investigators should draw particular attention to any official statements of National Coal Association or TVA found to be "false or unrepresentative."

Opposition to hydro-electric development on the score that less labor is required than for steam-generated power using coal was dismissed by Dr. Morgan as opposition to technical progress. Elimination of labor through the installation of machinery, he declared, is a fundamental policy of the coal industry itself and that industry "cannot object if the general public adopted the policy of the most efficient and economic method of meeting its power needs." The fact that "practically all the power being used in the Tennessee Valley is water power" seemed to him a fairly effective answer as to which form of power was the cheaper.

TVA has set aside \$100,000 for research in coal problems. Dr. Morgan intimated that the Authority might be willing to allot part of the sum to the work of Bituminous Coal Research, Inc., but felt that, if such allocation were to be made, there should be some assurance that the TVA program should not be subjected to "denunciation and slander" by the coal industry.

Action on the TVA proposal, explained John C. Cosgrove, chairman of the meeting, was outside the sphere of Bituminous Coal Research, Inc. Members of the research organization did, however, adopt a resolution transmitting the proposal to the board of directors of National Coal Association.

The report of the organization campaign of Bituminous Coal Research, Inc., showed that 31 producing companies, two operators' associations and one sales agency had subscribed for stock in the new institution. Total subscriptions to date aggregate approximately \$76,000, of which between 35 and 40 per cent are conditional. Other promises, said Mr. Cosgrove, will bring the total to approximately \$100,000. Under the bylaws approved at the meeting, the stockholders elected seven directors. Eight additional directors are to be chosen by National Coal Association. This selection by National Coal Association, it was explained, was for the purpose of assuring a broad representation of interests on the board.

Members of the board chosen by the stockholders' meeting were: John C. Cosgrove, president, West Virginia Coal & Coke Corporation; Douglas Gorman, president, Cumberland Coal Corporation; C. B. Huntress, president, Appalachian Coals, Inc.; C. E. Leshner, executive vice-president, Pittsburgh Coal Co.; J. A. Howe, vice-president, Truax-Traer Coal Co.; George K. Smith, president, Sunday Creek Coal Co.; and C. G. Berwind, vice-president, Berwind-White Coal Mining Co.

INDEPENDENT STUDY

Of Power Costs Proposed by TVA

JOINT AGREEMENT by the coal industry and TVA for "an impartial investigation" of the costs of generating electricity by hydro-electric power and by coal was proposed by Dr. A. E. Morgan, chairman, TVA, at an organization meeting of Bituminous Coal Research, Inc., at Washington, D. C., Oct. 25. In proposing this study by "a body of competent, disinterested investigators," however, Dr. Morgan stipulated that the actual costs of producing coal should include "social" losses. The six points to be covered in the investigation, as outlined by the TVA chairman, were:

1. Cost of electric power generated by the Wilson, Norris and Wheeler dams, with such stand-by steam plants or other additional water storage as may be economical, and with the wartime development at Muscle Shoals appraised "at a fair present value."

2. Actual cost of coal mined within reasonable transmission distance from these dams, including "indirect government subsidy, if any, to the coal indus-

try in the form of relief to the underpaid or distressed mine workers or other forms of subsidy. This should include the actual total cost of coal, including social cost, within coal-mining communities, and what the total cost would be if coal miners were paid living wages equivalent to the standard paid in the construction of hydro-electric properties and in their operation."

3. Extent to which steam plants are paying less than market prices by buying distress tonnage.

4. Actual present cost of generating power in steam plants within transmission distance of the dams and what the cost would be of abandoning present plants, paying off that capitalization and building new and modern steam plants in accordance with the best modern practice.

5. Cost of meeting additional requirements for power in this region by the construction of additional modern steam plants and comparison of that cost with hydro-electric power generated at the three dams "as we work out the ad-

NEW FANS REDUCE

+ Power Bills at Mines

Of Hillman Coal & Coke Co.

AROUND the mines, the fan is almost the only unit that has a weary grind of 24 hours daily for 365 days in the year. In these times of irregular operation and 7-hour working days at bituminous mines, the contrast between the operating time of fans and that of other units is startling. In most mines, the fan runs eight times as steadily as any other equipment, and therefore its power demands are eight times as important as those of any other unit; thus a small reduction in kilowatts required becomes vital.

Unfortunately, the fan is a unit from which a varying duty is demanded, depending on the size of the mine to be ventilated and the condition of its airways. All fans have a definite relation between pressure produced and air volume delivered at a given speed. If the mine characteristics do not meet this set duty of the fan for any speed, its operating efficiency will be correspondingly lower.

A fan may have a rated capacity of 150,000 cu.ft. at 2-in. pressure and perform this duty for a number of years, but some day the owner may require a volume of only 100,000 cu.ft. at a different pressure. If he finds that the fan does not have its former efficiency, he reaches the conclusion that something is radically wrong with it. The fan has not changed, but the mine has. A different resistance is offered to the passage of the air. To meet this change in resistance and this new requirement of air volume, it is necessary to replace the fan by another that will be economical under these revised conditions, or possibly to run the fan at another speed, in which case the efficiency will not be improved.

Motors in general have but one economical speed. Even multiple-speed motors develop maximum efficiency only when running at a certain definite number of revolutions per minute. Hence both fan and motor have lower efficiency under different operating conditions than those for which the fan

was designed, and to get maximum efficiency a new fan and a new motor are needed to suit every change in operating conditions.

A company that has made major reductions in operating cost in this manner is the Hillman Coal & Coke Co., of Pittsburgh, Pa., and its example is interesting because all but one of the mines at which the changes in fans have been made have been faced with big reductions in the acreage still being operated—a condition usually accepted as a deterrent to any purchase of new equipment. Skeptical as directors and stockholders may be, however, at first, in the end expenditures that can be amortized in nine months by operating savings are welcomed, even when the equipment is sure to long outlast the mine in which it is installed. However, it is difficult to convince anyone that equipment still good should be discarded just because it is too large for the job to which it is applied and has an efficiency, owing to its construction, which is lowered too rapidly when the duty it is required to perform is decreased.

At Ella mine, near Webster, Allegheny County, Pennsylvania, was an old 20-ft. exhaust fan, which at a mine fitted to its proportions would have shown satisfactory efficiency. This mine, however, was well on its way to exhaustion; its former area of 1,610 acres had been depleted to less than 100 acres, but, as the minable coal thickness was 62 in., the mine had still several years' life. Many mine managers, however, would have determined to finish the operation without purchasing any more equipment.

Operating at 67 r.p.m. and making 62,700 cu.ft. of air per minute at 1.5-in. water gage, the fan efficiency had dropped to 49 per cent. Over-all efficiency of fan, motor and drive was down to 26.45 per cent. Almost 75 per cent of the energy supplied it was being wasted. The 150-hp. induction slip-ring motor, which was designed to

run at 600 r.p.m., was turning at only 349 r.p.m., its speed being wastefully reduced by the interposition of electrical resistance. The power factor was 51.6 per cent, bringing the combined efficiency for motor and drive down to 50 per cent. Obviously, the motor was as much out of place as the fan, but both needed to be changed. A 150-hp. two-speed motor was available to make one of the changes, and if it had been installed instead of the other motor, that change alone would have saved \$140 per month. But, as the demand for air volume diminished, the fan would have shown an even greater inefficiency, for its speed had reached a stage where successive reductions in speed and air output were accompanied by larger decrements of efficiency, because of the introduction of still more resistance.

So it was decided to replace this hulking 20-ft. fan with a single-stage 7-ft. Aerovane running at 639 r.p.m. The 62,700 cu.ft. of air the old fan was making was somewhat more than the mine required, so the fan chosen was designed to give 58,200 cu.ft. of air per minute at a 1.1-in. water gage, the lowered pressure being due not alone to decreased volume but to cleaning out of aircourses. By introducing the new fan and new motor, the saving was \$215 per month, or \$2,580 annually, or about twice the cost of the change. Savings will be greater as time passes and less air or lower water gage is needed, for the fan will continue to be just about as efficient at lower speeds, because of its inherent characteristics.

Another example is the ventilation system at the Gibson mine, near Bentleville, Washington County, Pennsylvania, a mine producing 2,000 tons per day. The original area to be mined was 631 acres, of which about one-half still remained, with coal having a minable thickness of 62 in. The old ventilator was an 8-ft. disk fan driven by a 75-hp. motor. It produced 97,000 cu.ft. of air per minute, with 1.4-in. water gage and with an input of 54 kw., or 72.36 hp. More air was needed, but the fan was already running at its maximum speed. It was decided to replace it with a

9-ft. single-stage exhaust Aerovane and a 50-hp. motor.

When the new fan was installed, at the same time as that at Ella mine, it delivered 119,500 cu.ft. of air at 1.6 water gage, with an input of 38 kw. The same volume of air as delivered by the old fan at the water gage required to circulate that air would at this rate take only an input of 25.5 kw., so that the new fan showed a saving of 28.5 kw. and a yearly saving of \$1,769. In this case, however, the new fan was necessary for the operation of the mine, but the increased air required and delivered was accompanied by a marked saving in power. A little figuring would reveal that between the two measurements a large amount of improvement was made in the mine, but this does not in any way vitiate the saving due to fan and motor change, for it is based on the horsepower impressed on the air in each case, which is the actual work performed by the fan.

Over-all efficiency of the fan, motor and drive was 60.48 per cent. With the conservative figures of 88 per cent for motor efficiency and 92 per cent for drive efficiency, the efficiency of the fan alone would be 74.7 per cent.

Patterson mine, at Elizabeth, Allegheny County, Pennsylvania, originally comprised 1,077 acres, and when it changed fans it had less than one-sixth of the original acreage. Its coal had a minable thickness of 60 in. Here a 16-ft. centrifugal fan was replaced by a 6-ft. Aerovane. The old fan was running at 77 r.p.m., making 45,400 cu.ft. of air per minute at 1.1-in. water gage, and the input to the motor was 41.5 hp. Operating efficiency was 18.9 per cent. Opposed to these values, after the repair of leakage in the shaft, the new fan ran at 728 r.p.m., delivered 44,800 cu.ft. of air at 1.25-in. water gage. The greater water gage with lessened volume was due to the fact that more of the air now circulated through the working faces, increasing the resistance. But here again the horsepower impressed on the air, or, more specifically, the product of air volume and pressure, is what determines the work done by the fan. The input to the new motor was 23.5 hp. Had the other motor been impressing this heavier duty on the air, it would have required an input of 46.53 hp. So the saving due to the new fan and motor is 23.03 hp., or 17.18 kw. per hour, or \$1,363 per year at the rate of 0.9c. per kilowatt at this mine.

In this, as in the case of Ella mine, a 25-hp. 440-volt motor was rewound for 2,200 volts. The motor efficiency with the new winding is not known, but it is considerably lower than the efficiency of a standard motor designed for the new condition would be. For this reason the efficiency of the fan cannot be calculated with certainty. On the strength of efficiencies determined at

Gibson and Jerome mines, where the motor efficiencies are known, it can be assumed that the new fan efficiency is above 70 per cent.

At the Pike mine, Brownsville, Fayette County, Pennsylvania, the original area was 477 acres, and the fan change was made when it had dropped to about one-third that area. The old fan was a 20-ft. centrifugal exhaust unit and was revolving at 50 r.p.m. and giving 118,900 cu.ft. of air at a 1-in. water gage. The input to the motor was 43.55 hp. and the over-all operating efficiency was 43 per cent. With the new 8-ft. Aerovane, 110,000 cu.ft. of air per minute was delivered at 0.76 water gage, suggesting the presence of a leak in the shaft, or the water gage would have been higher. Input was 25.9 hp. Operating efficiency was 50.9 per cent and fan efficiency 66.9 per cent, based on a motor efficiency of 80 per cent and a drive efficiency of 95 per cent, a V-belt drive being used. The speed of the fan was 600 r.p.m.

In this case, the work done on the air by the new fan was, roughly, 70 per cent of that done by the old. One might reduce the input to the old fan accordingly and subtract the input to the new fan to get the saving derived from the change in horsepower-hours and convert these to dollars per year, but the motor was so considerably burdened by resistance added to slow it down that it would not have given anything like 70 per cent of the input. The saving, therefore, is much larger than could be calculated as indicated.

The examples show that when a mine has passed its meridian and is about half way to its closing years, it is always well to consider whether it needs a new fan to carry it through its period of decline.

A 6-ft. Aerovane booster fan has been installed in the main return of one section of the Jerome mine, Jerome, Somerset County, Pennsylvania, and also a 9-ft. Aerovane, used as a blower, in a shaft three miles from the hoist. The main fan is a Jeffrey centrifugal exhaust fan of 12-ft. diameter. None of

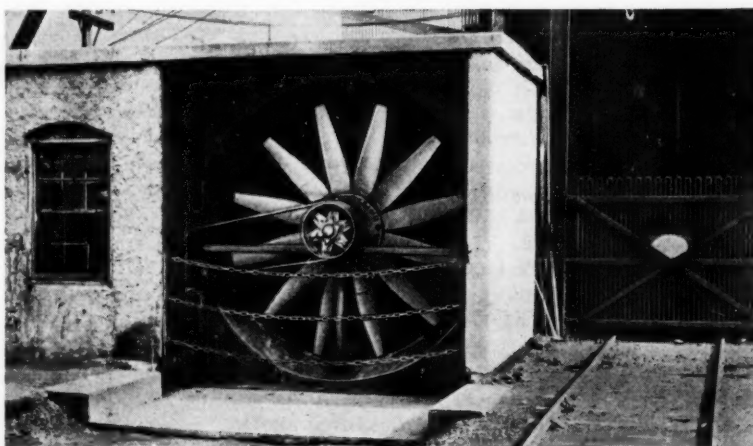
these Aerovanes has either venturi or chimney, and all are single-stage.

A seventh fan of the same type, this one 8 ft. in diameter and of two-stage construction, will be installed at Edna No. 2 mine, near Irwin, Pa. It will replace a fan that has been in operation 30 years and is to be installed despite the fact that the mine has hardly 10 years to run. It enables the Hillman Coal & Coke Co. to displace a 200-hp. motor with one of only 60-hp. The total expenditure for fan, motor, Texrope drive and installation will be between \$3,000 and \$3,500, exclusive of the salvage value of the present motor, and the estimated saving in power alone will be between \$1,800 and \$2,200 per year.

Difficulty was experienced at Oakmont mine, Barking, Pa., near New Kensington, with the belt by which the fan was driven. It could not be kept in condition, and a slower speed of operation seemed imperative. A 250-hp. 600-r.p.m. motor was replaced by a 200-hp., 450-r.p.m. motor when the air-flow was increased from 150,000 cu.ft. per minute to 170,000 cu.ft. The original pulley on the fan shaft, which had a diameter of 11 ft., was changed to one of 9 ft. The same 38-in. pulley was used on the motor. In consequence, belt speed was reduced from 5,300 to 4,300 ft. per minute, and the belt gave good service. The 200-hp., 450-r.p.m. motor was taken from a slope hoist and the 250-hp., 600-r.p.m. motor used to better advantage for that purpose.

In order to find air losses, air surveys were made at Jerome, Gibson, Pike, Emerald and Edna No. 2 mines, using the ordinary aneroid, and places were leveled off or the rock removed in accord with the findings. Stoppings are built of brick or tile and replastered with cement mortar. As the haulage is on the intake, the joints and air holes on the haulage side of the stoppings are under pressure, and when the stoppings are replastered on the haulage and most convenient side, the air pressure tends to drive the mortar into the joints and crevices and hold it there till the mortar hardens.

Fan at Gibson Mine of Hillman Coal & Coke Co.



CASUALTIES REDUCED

✦ By Unusual Mechanization Methods

At Anthracite Colliery*

By CHARLES DORRANCE

President, Penn Anthracite Mining Co.
Scranton, Pa.

FOR SEVERAL YEARS, the Penn Anthracite Mining Co. faced the problem of developing a tract isolated from all its other operations. Because of the thinness of available beds, inclination of the coal measures and nature of the roof, a form of low-cost mechanized mining that would show an improvement in both operating and compensation costs over conventional systems was essential. Out of these stringent requirements evolved the plan adopted at the Harry Taylor mine. Several features of this plan are without precedent and, consequently, give rise to new problems in management and accident prevention.

This mine is in the northern anthracite field. The coal measures pitch at an angle of approximately 15 deg. Available coal consists of two beds (Dunmore Nos. 2 and 4) separated by about 100 ft. of rock. The seam is reached by a rock slope on a pitch of 25 deg. driven into the center of the coal area. The No. 2 Dunmore averages 30 in. of comparatively clean coal with a roof of 3 to 8 ft. of soft slate, overlain with a good bench of sandstone. The No. 4 Dunmore averages 36 in. of coal with an 8-in. band of slate near the top of the bed and a 6- to 18-in. band of bone over which is a good sandstone roof.

Room-and-pillar methods, using 60-ft. centers, with a 30-ft. chamber and 30-ft. pillar, have been adopted. Development work is driven to the pitch, chambers are driven parallel to the strike of the bed, and pillars are extracted as soon as chambers are completed. All coal is undercut with low shortwall mining machines and is carried from the working face to the railroad car by flight and belt conveyors. As this conveyor system is reversible, materials and supplies can be carried to the working faces on

it. Tracks have been installed in both the main and inside slope to facilitate the movement of heavy machinery.

The mine is not gassy and open lights are used. A two-speed, blower-type fan of 100,000-cu.ft.-per-minute capacity affords ventilation, with a shaft for the intake and the main slope for the exhaust. This reversal of the usual practice materially assists winter operation and eliminates ice with its many dangers on main slope and traveling ways.

Installation of the continuous-flow conveyor system in place of cars and tracks has removed the hazard inherent in handling and dumping run-of-mine coal. Trolley wires, mules, derailments and slope-haulage-equipment failures have been entirely eliminated. Hazard of handling material and supplies has been noticeably reduced. Chains, sprockets and gears are protected with guards. Workers not using proper guards are subject to disciplinary measures. Retarding devices and buffers have been installed at the colliery to prevent coal which is being carried down the pitch on conveyor belts from rolling down ahead of the belt. Wooden handrails and steps are placed at strategic points so that employees can cross moving conveyors with safety. Wooden walkways, consisting of two 2x12-in. planks with 1x4-in. cleats, provide proper footing on pitching manways. Electric lights are installed along main-slope and gathering conveyors.

If a conveyor stops for any reason, interlocking controls automatically stop all conveyors from that point to the face. To resume operation, each conveyor must then be started individually, thus insuring against the hazard of a conveyor being set in motion at some remote point while men are working on it. Stop buttons are placed at intervals along conveyors so that they can be shut down in event of trouble. Definite instructions and standards prescribe clearances around each machine

to insure ample room for maintenance and travelway.

Use of undercutters in producing the entire coal output—an unusual feature in the anthracite fields—has reduced the shooting hazard. Shooting off the solid, twelve to sixteen drillholes, each containing from four to six cartridges, were necessary. With the coal undercut, the same work is accomplished with five drillholes, each loaded with 2½ to 3 cartridges.

Each working place has its own undercutting machine, thereby eliminating the hazard involved in moving the machine from chamber to chamber. Operation of these machines on pitches varying from 14 to 20 deg. made necessary several precautionary measures to prevent the machine from sliding back from the face while cutting was in progress. In driving up the pitch, the machine is reversed after each operation and stabled alternately on the right and left ribs, eliminating the hazard inherent in recrossing the face after it has been undercut. In cutting across the 30-ft. face, the position of the pulling jack has to be changed frequently, the machine advancing about 5 ft. for each change. The jack is put in place also when the machine is stabled on the rib; in each case the end of the jack is placed in a hole drilled in the roof for that purpose. No men are permitted to work below the machine on the lower rib side while sumping and cutting are in progress. Tailings are removed only while the machine is stopped.

Interlocking devices are provided on drum and cutter-chain controls to prevent accidental starting of the cutter chain. A cutter-bar lock consisting of a heavy piece of iron with both ends bent down is placed over the cutter bar near the body of the machine to give further insurance against inadvertent starting of the chain.

Because of the severe operating con-

*Abstract of an address entitled "Accident Prevention at Harry Taylor Mine," presented at the 23d National Safety Congress, Cleveland, Ohio, Oct. 3, 1934.

ditions, only the best obtainable steel is used for drum ropes. Ropes are inspected daily and renewed at an average interval of two weeks. The used rope is relegated to less severe working conditions. After a short period of operation, it was found that only 2-in., extra-heavy steel jack pipe would give any length of service, so this type of pipe has been made standard at this operation. At regular intervals, feed drums are inspected and cleaned to insure ease and safety of operation; this work is done under the supervision of the machine-maintenance foreman.

Concentration of mining to a small area has several advantages. Supervision is localized, and the foreman can visit each place several times daily. No foreman is required to supervise more than eight working places. The roof in the lower bed tends to disintegrate rapidly upon exposure to air, and fast concentrated mining aids greatly in the safe and economical recovery of coal. Pillars must be drawn as soon as possible after the chamber has been driven.

Movement of machinery is over minimum distances and the work is accomplished with minimum exertion. After the initial installation of the equipment to be used in a chamber, consisting of undercutter, face conveyor and chamber conveyor, the machines are not removed from the place until it has been driven forward 1,000 ft. and the pillar extracted. All the chamber equipment is then removed to a new location, and the procedure is repeated. This plan provides for the least possible movement of equipment, up and down the pitch.

Power is transmitted into the mine through a lead-covered, steel-armored, varnished cambric-insulated cable to two separate transformer substations. From these points power is distributed to the motor-driven equipment. This main cable is provided at either end with disconnecting switches and is protected at the source with an overload tripping device.

All distribution cables are triple-conductor, standard copper wire, rubber-insulated, jute-filled, incased in a heavy impregnated spiral-weave cover, suspended from the roof on large porcelain insulators. These distribution cables are specially made with the ends of each conductor fitted with a lug, for ease of connection. With this arrangement, individual strands of the copper cable cannot protrude through the tape at the joint. Cable ends are staggered so that the joint may be properly taped and painted and the conductors may be well insulated from each other. All distribution elements are protected with approved fused switches in locked boxes which can be opened only by designated authorized persons.

Cables leading from safety switches to all equipment are rubber-covered, incased in a solid rubber covering and insulated for 1,500 volts. Each cable is

made up of four flexible insulated conductors, three being for power transmission and the fourth (colored for identification) for a ground wire. Control cables are of similar all-rubber construction. Splices in rubber-covered cables are made in every instance in a special vulcanizing machine. This insures that the insulation at the splice is watertight and possesses insulating qualities as good as those of the original cable.

To be assured of a satisfactory circuit to ground in the event of an electrical failure in motors, undercutters, safety switches, control boxes, each piece of electrical equipment is connected by copper wire to a 4/0 bare standard copper conductor. This is brought direct to the surface and connected to a carefully constructed charcoal-and-salt ground embedded in moist earth near the mouth of the main slope. All maintenance men are trained to treat the ground connection as of importance equal to that of the power circuit and are disciplined for failure to connect the ground circuit on newly installed or transferred equipment.

All shotfiring is done with a plunger-type, 50-hole-capacity blasting machine. The firing line, using No. 14 insulated wire, is carried on props and is placed near the roof on the opposite side from the power cables. During loading and firing operations, all power to the face is disconnected; each face unit is provided with a suitable rubber-covered plug and receptacle connector. Permissible powder is used; powder and detonators are stored in individual wood boxes under lock and key. Throughout the mine, powder is carried in suitable bags, thereby eliminating accumulation of flammable material in working places, use of improper tools in opening boxes, and danger that nails may protrude from the boards of discarded boxes. Powder is stored outside the mine and only a single day's supply is taken in at any time. No blasting supplies are allowed to be carried to the face on the conveyors.

Timbering follows a definite plan, with rows of props at regular intervals and equally distant from adjacent rows. The maximum distance between props is 6 ft. Since the conveyors must be kept absolutely on line, the conveyor line is used as a base, and miners are instructed to set each prop at a specified distance from the center of the conveyor line. The result is a series of straight rows of props which present an orderly appearance. This practice also encourages the miner to keep the details of his place in workmanlike manner. To date, the number of roof-fall accidents at this mine is far below that for hand mining under similar conditions at other operations of the company. All employees are required to wear protective headgear and spectacle-goggles.

A determined effort has been made to keep the entire property in clean and orderly condition. Each conveyor-junction man is assigned to a certain territory and is responsible for its cleanliness. Results are gratifying both in appearance and in the fact that the travelways offer no obstacles under foot, thus reducing the hazards of tripping and falling or of stepping on protruding nails.

Probably one of the most important phases in the accident-prevention measures at this operation is the training of the personnel. The management, realizing the radical departure from the usual mining practices in this locality, made every possible effort to select the most intelligent type of employees as the key men in this undertaking. It was necessary not only to teach these men how to operate and maintain their machines but also to instill into their minds practices and ideals that make for safety. Speed of production was neglected until it was felt that the men were entirely familiar with both the operation of the machinery and the natural physical conditions. The next step was to bring the machines up to their rated capacity. These steps were taken with the closest supervision possible, both by company officials and representatives of the manufacturers. After it was felt that the desired results were forthcoming, these men were given new men as understudies and gradually the working force was expanded until the desired production had been reached.

Discipline is administered for an infraction of safety regulations; safety literature is distributed at frequent intervals to all men, and interesting posters are placed on an illuminated bulletin board to confront the men as they enter and leave the mine. Safety inspections are made at regular intervals by the safety engineer and colliery superintendent both underground and on the surface. The general maintenance foreman must inspect all machinery periodically to detect worn and defective appliances. As is the policy of the company at all its collieries, the supervisory force at Harry Taylor mine has been given a special course in safety. Through cooperation of the U. S. Bureau of Mines, every employee at the mine has had complete first-aid training.

In formulating the original layout at the Harry Taylor mine, the subjects of hazard elimination and accident prevention were major considerations. As the mine has been operating only 1½ years, the scope of its accident statistics is necessarily limited. Nevertheless, results already attained justify the belief that the mining system adopted is a marked step toward accident prevention. The record shows three fatalities for 2,000,000 net tons of production, none of which accidents occurred underground.

WIDENS MARKET

+ For No. 5 Illinois Screenings

By Turning Fines Into Domestic Coke

DEVELOPMENT of an additional market outlet for the bituminous industry through the transformation of fines into a more valuable smokeless fuel primarily for domestic use was the major objective of the Radiant Fuel Corporation, of St. Louis, Mo., in the erection of the coking plant now operating at West Frankfort, Ill. In line with this objective was the development of a process which would produce an acceptable product from coals ordinarily considered non-coking on a commercial basis, and which would be simple in operation and low in cost to facilitate installation at the mines.

The West Frankfort plant at the present time consists of a battery of ten Knowles sole-flue ovens with the necessary coal-charging and coke-discharging and quenching equipment; coke-handling, crushing, screening and loading facilities; a gas plant, including the necessary cleaning and storage equipment; tar-recovery, storage and loading facilities; and the necessary auxiliary equipment. Installation of a battery of fifteen more ovens, a sal ammoniac plant and a tar distillation plant are under consideration.

The raw coal used is $\frac{3}{8}$ - and $\frac{1}{4}$ -in. (No. 5) carbon (unwashed) from the neighboring mines of the Old Ben Coal Corporation, which distributes the product under the trade name "Carbonite." Some experimental work has been done on coking dust from dedusting plants, indicating its feasibility. Capacity of the plant, which began operations Dec. 23, 1933, is 100 tons of raw coal per 24 hours, of which 75 per cent is recovered in the form of coke, including breeze. Excluding the latter product, the yield of Carbonite is 60 per cent.

Raw coal comes to the plant (see Fig. 6 for ground plan) in railroad cars which dump into a track hopper. From the hopper, a 24-in. belt conveyor with a capacity of 25 tons per hour carries



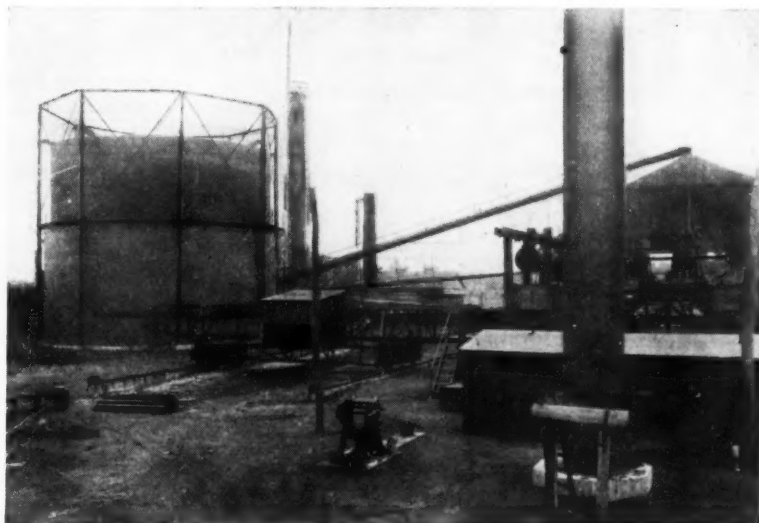
Fig. 1—Furnace-Size Carbonite in the Car

the coal up to a 110-ton boiler-type bunker on top and at one end of the battery of ovens. Four charging tracks are laid on top of the battery, and four hand-propelled charging cars are employed. Each car is equipped with two bottom gates, which correspond to the charging holes in the top of the ovens, and has a maximum capacity of 2 tons.

A charge, however, usually consists of 5 tons of coal, which, using the four cars, is deposited in eight cone-shaped piles on the oven floor. The coal is then spread out in an even layer 10 to 12 in. deep by using the pusher with the pushing head removed. The doors at either end of the oven are then sealed, together with the holes in the top, and coking begins.

Gas released during the period of gas evolution leaves the ovens through mushroom-type dampers and is collected in a header to which the off-take pipe leading to the Roots positive-displacement exhauster and the byproduct plant is connected. A butterfly valve regulated by an Askania controller with a precision of 0.02 in. of water pressure is inserted in the off-take line to maintain a constant pressure—approximately atmospheric—in the ovens. From the exhauster the gas is forced through shaving scrubbers to remove all traces of tar, and then goes to a Seaboard liquid-purification tower, where the sulphur is extracted. The final step before

Fig. 2—General Plant View Showing, Right, Ovens, Charging Cars and Raw-Coal Bunker; Center Foreground, Coke Pusher; and Left Rear, Byproduct Plant and Gas Holder



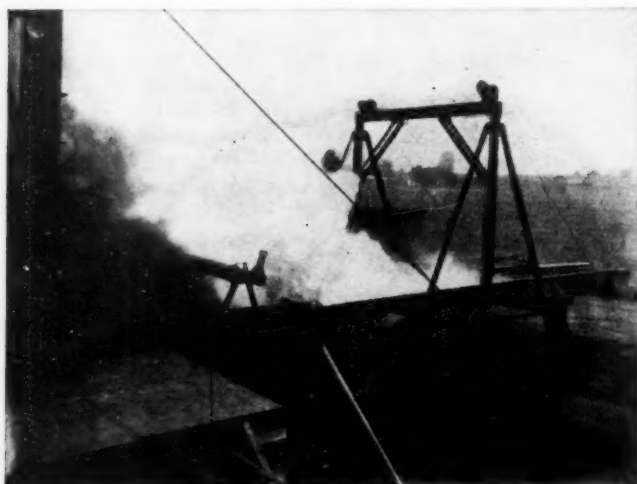


Fig. 3—Quenching Coke as It is Pushed Out of the Oven

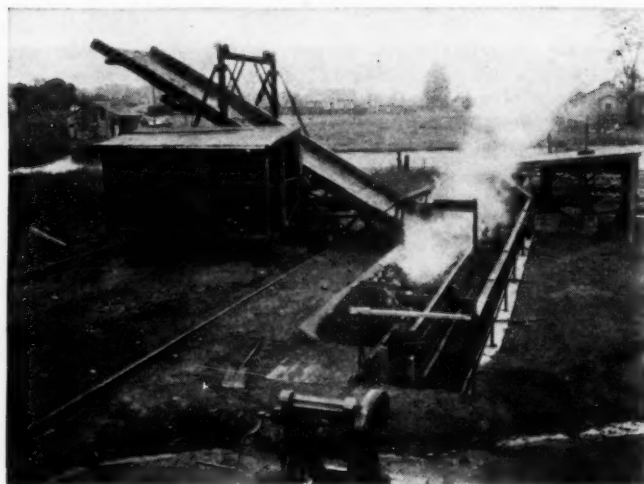


Fig. 4—Quench Pan Tilted to Discharge Coke Into the Wharf

the gas enters the 50,000-cu.ft. holder is to force it through an oxide box, where traces of sulphur missed in the Sea-board tower are removed. Surplus gas is sold to the Western United Gas & Electric Co., serving a group of southern Illinois towns, and is pumped out of the holder by Type 8 Cooper-Bessemer gas engines and delivered at pressures as high as 70 lb. per square inch.

Tar recovery takes place as the gas passes through the washer, the tar being trapped in the cooling-flushing water, which flows into an open concrete tank. The tar, with a specific gravity of 1.10, settles to the bottom of the tank, while the water overflows into a sump, from which it is pumped to the cooling tower prior to re-use in the washer. Moisture content of the raw coal is approximately 10 per cent, and this also is condensed in the washer and recirculated. Continuous circulation of the flushing water and installation of a cooling tower were adopted as a means of circumventing possible shortage and avoiding the cost

of purchasing the necessary supply in case it was run to waste.

The tar normally runs 2 per cent free carbon and is very fluid at normal temperatures. These qualities result in ready separation from the water in the receiving tank, so that the tar to storage usually contains about 3 per cent of moisture. A steam coil in the storage tank is depended upon to reduce the moisture to 2 per cent or less before the tar is loaded into tank cars.

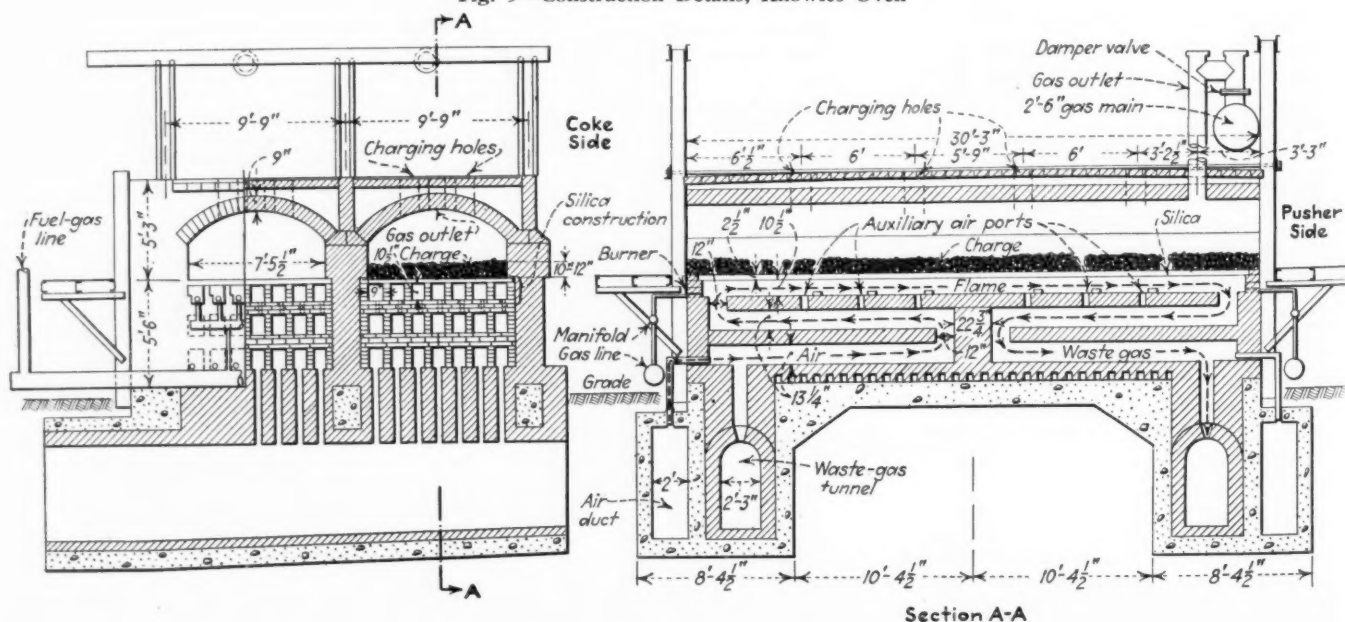
Upon completion of carbonization, the charge is pushed out of the oven by a traveling pusher into a traveling quench car (Fig. 3), designed to receive it in approximately the same shape and condition prevailing in the oven. As the silvery appearance of the coke is a definite market asset, quenching is arranged so that the unquenched coke is exposed to oxidation for the least possible time. The receiving pan, which is turned up slightly at the ends, is filled with water to a depth of approximately 1 in. and the spray mounted on the end next to the

oven is turned on as soon as the charge appears.

The final step in quenching takes place at the coke wharf, and consists of hosing down any hot spots. By tilting the pan as in Fig. 4 the charge is dumped into the wharf, from which it is transferred on a chain conveyor to a single-roll crusher with an opening of 3 in. set over the end of a 24-in. belt conveyor leading to the screening and loading plant. This and the raw-coal conveyor (Robins) are equipped with heat-resisting coke belts. The crushed product is separated into three sizes on a shaker screen— $3 \times 1\frac{1}{2}$ -in. furnace, $1\frac{1}{2} \times \frac{1}{2}$ -in. pea, and $\frac{1}{2}$ -in. breeze. The latter consists largely of partially coked fines from the top of the charge. Each size is loaded on a separate track—the furnace over a Robins belt loading boom.

The ovens used at West Frankfort get their characteristic designation from the fact that the coal charge lies in a horizontal, rather than a vertical, layer, which is heated from beneath through

Fig. 5—Construction Details, Knowles Oven



a silica floor. This particular feature is cited as the chief factor in the coking of what, under ordinary circumstances, would be a non-coking coal. With the charge lying horizontally, the distillation products go up through the coal as the shortest route to the oven outlet. Thus they are kept away from the heating surface, preventing cracking, and the successive condensation and reevaporation of the bitumens, or tarry substances, as the coking zone travels upward utilizes to the fullest extent the cementing material available in the coal.

Coking temperature is held at 2,500 to 2,600 deg. F., which is below the melting point of the silica used in the floor and around the combustion flues beneath it, and, while the flue temperatures maintained are the same as those ordinarily employed in high-temperature, the resulting product has certain qualities of low-temperature cokes, including low ignition and combustion temperatures. Carbonite therefore is compared with coal in respect to kindling qualities, and supports combustion at relatively low temperatures—both major factors in a product designed for domestic use. These qualities also make it possible to increase the size when used as a domestic fuel.

The heating arrangement also produces a tar running unusually high in cresylic and other tar acids. Average yield of tar is 9 gal. per ton of coal, containing between 30 and 35 per cent

of valuable tar acids, against 10 to 15 per cent with the regular high-temperature process. Indicated gas yield is 8,000 cu.ft. per ton at 500 B.t.u. per cubic foot. Net available for sale after supplying the requirements of the plant is 3,000 cu.ft. per ton.

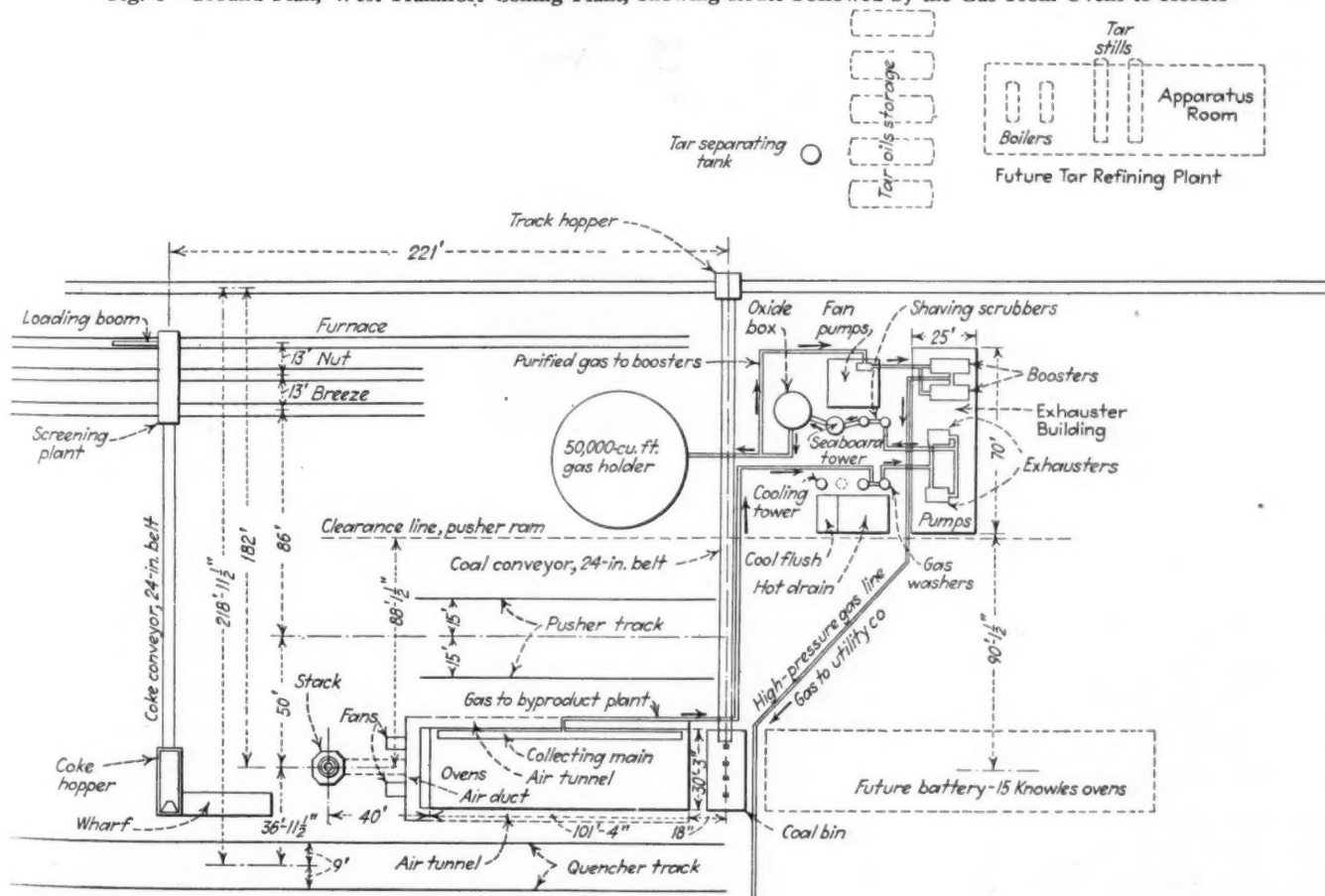
Gas for heating the ovens is taken from the system after it passes the shaving scrubber, as it is unnecessary to extract the sulphur when used for this purpose. Fig. 5 shows the arrangement of the burners, air ducts, combustion flues and waste-gas tunnels, and Fig. 6 the location of the fans supplying air, air tunnels and waste-gas stack. The ovens are fired from both sides alternately every 30 minutes. One of the problems in connection with firing was to stretch out the flame as long as possible; this was accomplished by reducing the air supply at the burner and installing auxiliary air inlets, as shown in Fig. 5. During a particular firing period, much of the heat in the waste gas is stored up in the checkerwork on the opposite side, and is given up when firing is reversed. Coking rate is approximately 1 in. per hour, and at the time this article was prepared the coking period was 12 hours, each oven being charged with 5 tons of coal.

The design of the ovens also is a factor in reducing investment. Except for the silica brick used in the oven floors, construction is based on the use of first- and second-grade firebrick. The

horizontal charge brings the pushing level down close to the ground, thus reducing the height of the pusher and allowing it to be made lighter. Low investment cost is a prime requisite for coal-mining applications, where relatively small throughputs would be the general rule. The design also permits the ovens to be shut down and handled with the same flexibility as a steam boiler, as the brickwork is identical with a boiler setting except for the limited silica construction.

One of the projects at West Frankfort was the demonstration of the practicability of using the gas in internal-combustion engines, consequently all of the stationary equipment, such as pumps, conveyors, exhausters, fans and crusher, are driven by automobile engines using clean gas from the holder. Employment of this type of motive power was made possible by the development of a carburetor for this service by the company. The pusher and quench car also are operated with automobile engines using a mixture of benzol drips and gasoline as fuel. Where possible, direct market outlets for the gas are most desirable, but gas can be converted to electricity through the use of the internal-combustion engine and used at the mine or sold. The nature of the crude tar also holds out possibilities, as fuel for diesel engines for standby electrical service, and independent experiments have demonstrated the feasibility of this application.

Fig. 6—Ground Plan, West Frankfort Coking Plant, Showing Route Followed by the Gas From Ovens to Holder



MINERS' SAFETY AND HEALTH

+ Discussed From New Angles

By Safety Congress Meeting at Cleveland

SAFETY under the NRA, accident reduction with an all-conveyor system of handling coal, the executive slant on safety work, mining dusts and respiratory diseases were highlighted at the Mining Section sessions of the 23d annual safety congress of the National Safety Council, held at Cleveland, Ohio, Oct. 1-5. The depression, declared W. E. Newberry, superintendent, Ohio & Western Pennsylvania Dock Co., in welcoming the delegates to the mining meetings, presided over by P. M. Arthur, retiring chairman, in many cases has upset the careful safety work of years and made it necessary to start it all over again.

Though there have been some signs recently of a decrease in safety in coal mines, said Daniel Harrington, secretary, Mining Section, the record to date this year is highly encouraging, especially as regards explosions and other disasters. A similar statement was made by Harry L. Gandy, Jr., National Coal Association. One of the larger bituminous properties, he said, had actually operated approximately three years without a lost-time accident. Accidents, including compensation, hospitalization and medical care, cost the bituminous operator 5 to 10c. per ton. Mine owners are keenly alive to the need for curtailment of these costs, though more greatly interested in the humanitarian aspects of accident prevention. Mine-fire hazards, he declared, had been stimulated this year by the long drought.

Mine workers today, said G. B. Dunbar, general superintendent, Mather Collieries, are thinking of everything but safety. They try to better the 7-hour day by getting through with their work by 12 or 1 o'clock. They keenly resent discipline, and at one mine made a bonfire of their safety hats. With such an attitude, safety has become more difficult of attainment. The older miners are the worst hazards; they resent direction, feeling that they

know more than their foremen. The greenhorn is more readily disposed to comply with regulations and, therefore, has fewer accidents than older men.

Past is the day of compulsion in safety, asserted J. J. Forbes, U. S. Bureau of Mines. Today men must be led to see what safety holds for them, and the J. A. Holmes Safety Association is teaching the men to find the way of safety, each man for himself.



P. M. Arthur
Retiring Chairman, Mining Section

To get a man interested in the safety movement, he must be a part of it. Faced with a decline in safety after the NRA code was signed, C. W. Gibbs, Harwick Coal & Coke Co., called a meeting and invited the union leaders, who unhesitatingly told the men that the code supported the company in maintaining safety and required mutual cooperation of mine workers and staff. Since that time conditions have greatly improved.

"Since we got the union back," said W. Roy, Hanna Coal Co., "we have had

better cooperation in our safe operation than before. In fact, one local union has passed a resolution that it was the purpose of every man in that mine to safeguard himself in every way against accidents." The NRA Code, stated Francis Feehan, was the first contract between operators and miners that even mentioned safety, and it demanded cooperation from both for safe operation. It was, indeed, the opening wedge for safety regulation.

Power wastes in ventilation were emphasized by H. M. Johnstone, superintendent, Sayreton (Ala.) mine, Republic Steel & Iron Co., who said one superintendent declared he actually favored leakage along his slope, as the water gage under that condition did not need to be so high and power was saved, forgetting that if the air did not reach the face it was useless and should never have been set in motion by the fan. Continuous currents without splitting waste much power. At one Alabama mine, five booster fans were cut out and the mine provided with splits. The work was all done without cost, for the rearrangement was compensated by the power saved. At another mine the air was inadequate and a bigger fan was provided to deliver more air at the same water gage, but the mine would not take any more air at that pressure, and the old fan was reinstated while the needed work of cleaning up underground airways was undertaken.

Coal mining is improving its accident record, declared W. W. Adams, statistician for the Mining Section, though 1934 probably will make a less favorable showing than 1933. Haulage accidents appear to be decreasing, but all other major causes of fatalities are increasing. But one cannot feel assured, with winter approaching and two-thirds of the bituminous production coming from mines not at all rock-dusted and from many others only inadequately protected.

The improvement in the fatality rate is far more encouraging from the standpoint of tonnage per fatality than on the basis of man-hours. In 1933, 66

per cent of the men in bituminous mines worked in units having no fatalities, 74 per cent of the men in metal mines worked in units that also had no fatalities and 87 per cent of the men in surface workings labored for units having no fatal accidents. The metal mines did not show improvement in 1933, except in the lead-and-zinc group.

How conveyor mechanization has reduced accident hazards at the Harry Taylor mine of the Penn Anthracite Coal Co., Scranton, Pa., was described by Charles Dorrance, president, in a paper read by T. F. Steele, general manager of the company, and abstracted on p. 419 of this issue. The Harry Taylor operation has cutting machines, compressed-air drills, face, chamber, gathering and main-haulage conveyors. Of the three fatal accidents occurring since the system was adopted, two were of men who fell off railroad cars and one was of a man who was moving a boiler. One wheel of the wagon on which the boiler was mounted dropped in a ditch, and the boiler rolled over him. When the company acquired its mines, 32 fatalities occurred the first year and the production was 2,000,000 tons. The mines had been long working irregularly and their condition was bad. In the following year, fifteen fatalities occurred. The next year, the fatalities numbered twelve.

In reply to Mr. Gibbs, Mr. Steele said the belt line was about 5,000 ft. long. All coal passed over four belts between face and railroad cars. The mother belt was 1,000 ft., the gathering belt was 1,500 ft., the slope belt was 1,000 ft. and the outside belt 1,800 ft. long. The mine is double-shifted and produces about 500 tons per shift. Two cuts are made daily in each chamber, 30 ft. wide and 6 ft. 6 in. deep, using a 7-ft. cutter bar. In the two shifts, the place advances 25 ft.

Shots can be fired without moving the cross conveyor, as it stands 6 ft. from the face. Originally the cutting was up the pitch, but it was found advisable to drive the rooms along the strike. Steel plates are put under the cut and 60 per cent of the coal slides down into the conveyor and does not need to be lifted. The cross conveyor is a chain unit; the rest are of rubber. A leather harness devised by the Hudson Coal Co. and constructed by R. H. Burke is used by the men on the railroad cars to prevent further accidents such as described.

There are no set rules in disciplining. Layoffs depend on the seriousness of the offense, and that is determined by the colliery superintendent who is best acquainted with the man and the circumstance. Second offenders may get a two-day layoff; third offenders may be discharged at the discretion of the superintendent. Groups of three men sometimes go around the mine on invitation of the management to spot viola-



William G. Metzger
Chairman-Elect, Mining Section

tions and make suggestions. These men are often more critical than the management.

Compliance on the part of the executive with the laws and regulations of the State is not enough, said C. W. Crane, president, St. Joseph Lead Co. He must be alert to the need for greater safety and to the opportunities derivable from it. When he finds a good safety man, he must not steal him from his safety work and put him into the production department. Fatalities are costly, not only by reason of the compensation rightly paid to dependents but because they interfere with the operating schedule, depriving men of their earnings and the company of their

services, and because new men have to be broken in, and the cost of that training is equivalent to a whole week's wages. At one time the St. Joseph Lead Co. had a labor turnover of 233 per cent; last year the figure was 4 per cent. With such a small turnover, the work of training men in safe and effective work was greatly decreased and the cumulative effects of training became evident.

Safety work depends upon education. The good safety man is he who can keep up enthusiasm for safety when there are few accidents. The stimulation of an accident is helpful to safety efforts, but the safety department that is alert can conduct its operations successfully without such stimulus, which is both distressing and uneconomic. Every company should keep a balance account of the cost of the safety department and of its accomplishment. The six-year average of cost of compensation of the St. Joseph Lead Co., a self-insurer, is \$1.66 per \$100 of payroll. The safety work costs 73c. per \$100 of payroll, this covering the salaries and expenses of the safety department. The cost, therefore, has been \$2.39. The company would have had to pay \$4.66 had it purchased compensation, and the average cost of such compensation for the mines of the State was \$8.66. Actual costs for compensation should be known by every foreman, and the direct saving that arises from his individual efforts should be always in his mind. Every hazard should be studied by a large group of men. As one man scanning a roomful of people will not see and study them all, so a single man will fail to visualize all the approaches to safety and hazard. Safety requires the group mind with all the varied visual angles of every member of the group.

At the meeting of Oct. 4, R. N. Hosler presented a letter to H. L. Ickes, Department of the Interior, urging that the U. S. Bureau of Mines be strengthened and its work extended. A resolution approving of the letter and ordering its signature on behalf of the Mining Section was passed.

Dust of 3 microns and under, declared Dr. D. C. Cummings, assistant director, Saranac Laboratory for the Study of Tuberculosis, Michigamme, Mich., is the most harmful of mining dusts. Silicates are less dangerous than pure silica, with the exception of asbestos. Sharpness of the dust is not the cause of the trouble with silica. Silicosis is a pathological condition, not a disease, which must be feared because it prepares the silicotic for respiratory diseases. Cement, coal and hematite dusts favorably modify silicosis. Like many dusts they are inert.

In order to ascertain the disease, the doctor should have not only roentgenographs (X-ray photographs) but a 15- or 20-year record of the examinee's occupation. Symptoms are not in evi-

Mining Section Officers

William G. Metzger, Hudson Coal Co., was elected chairman of the Mining Section of the National Safety Council at the annual meeting held in Cleveland last month. J. W. Alt, Calumet & Hecla Consolidated Copper Co., was made vice-chairman in charge of membership; C. W. Gibbs, Harwick Coal & Coke Co., vice-chairman in charge of engineering; A. J. M. Ross, Homestake Mining Co., vice-chairman in charge of health. Daniel Harrington, U. S. Bureau of Mines, was reelected secretary and *News Letter* editor.

R. N. Hosler, Coal Mine Section, Pennsylvania Compensation Rating and Inspection Bureau, is chairman of the entertainment committee; J. J. Forbes, U. S. Bureau of Mines, heads the poster and slides committee; J. T. Ryan, Mine Safety Appliances Co., program committee; M. R. Budd, *Explosives Engineer*, publicity committee; W. W. Adams, U. S. Bureau of Mines, statistics committee.

John E. Long, Delaware & Hudson R.R., was reelected president of the Council, and W. H. Cameron, managing director and secretary.

dence even in the second stage of the silicotic condition. It is not silicosis that is the cause of disability or symptoms; it is the infection that supervenes. Neither silicosis nor pneumoconiosis is disabling, the latter form of fibrosis being defined as one derived from some agent other than uncombined silica. There is a "threshold" concentration of dust. More than that is hazardous, less is not. Perhaps 5,000,000 particles per cubic foot is this concentration, though in South Africa it is put at about 2,400,000 particles. Old scars of the lungs may evidence a past infection rather than one still existent. That is why the history of past infections is important in diagnosis.

Reliance cannot be placed unreservedly in silicosis experts, declared G. C. Bateman, secretary, Ontario Mining Association, Toronto, Can. The original Ontario law regarded the first-stage silicosis as an indication that the man needed rehabilitation and required the company to pay the patient \$500 to take care of him while he found another job. It was thought that would end the responsibility of the company. Some men protested against the law and went on working, agreeing to waive compensation of any kind. The companies gave these men some preference in selecting working places so as to prevent their silicosis progressing.

It was found that the men who received compensation misspent the money and then were without jobs or funds, with results so distressing that their silicosis progressed as rapidly as, or more rapidly than, the silicosis of the men who continued their work in the mines. Some had such pronounced evidences of tuberculosis that they were given by the courts the full compensation for total disability, or two-thirds of their regular wage, and to assure them of receiving this payment indefinitely the company was required to put aside the present value of \$12,000, less the \$500 already received. Second- and third-stage silicotics with infection got a pension equal to two-thirds of their wages, and the companies had to lay aside the present value of \$12,000 payable to these men. In the act of 1932, discontent of both companies and men caused a separation into third-stage silicotics and non-silicotics, and the time for proving the incidence of silicosis was reduced to two years.

In the meantime, however, the danger from silicosis was largely corrected through: (1) better ventilation and laying of dust; (2) examination of men on hiring with exclusion of all silicotics at any stage; (3) control of tuberculosis among employees and those who came in contact with them. Workers are not allowed to go back to their places after blasting until a sufficient interval has elapsed, during which the place is well ventilated and well sprinkled. The dust that can be seen is not dangerous,

but only that which is smaller than 5 or 6 microns in diameter. All the men hired within 10½ years in the Rand, South Africa, have been examined before hiring. Men who have not a clean bill of health have been rejected. None of these men has thus far developed silicosis. The controls indicated have been established for that period.

Of 350 men in the mining industry in Ontario receiving compensation for total disability for silicosis, only one man had his silicosis uncomplicated by respiratory disease, declared Mr. Bateman. When a man has silica fibrosis, said Dr. Leonard Greenburg, New Haven Hospital, the condition is menacing, but if his fibrosis comes from coal dust it may take some time before it is dangerous. The presence of carbon dioxide in a working place is not harmful in itself, but the man who breathes air thus contaminated may have to breathe three or four times as much air, and therefore dust, as he would nor-

mally. Thus he is more readily affected.

In thin coal, stated Dr. Fordham, the miner cutting coal or loading it is working in air containing 200,000,000 particles per square foot. In other places the dust density is only about 50,000,000 particles. Mining jobs are conducted in varying degrees of dustiness, and the effect of such dust must vary greatly with the job.

Coal dust, said Dr. Cummings, is inert. Dr. Dublin, of the Department of Labor, said he listed 70 industries in the United States in the order of their susceptibility to tuberculosis and placed silica-dust industries at the top and industries with coal dust at the bottom. He did not believe coal dust merely diluted the silica dust where both were present, but that it actually inhibited physiological changes. The injurious character of large densities of any dust, including specifically coal and hematite dust, were emphasized by Messrs. Forbes and Harrington.

New Michigan Mine Sets Goal for Low Cost And Minimum Degradation

(Concluded from page 414)

the depth of the bed so that rescreening is not obstructed. Both the lump and egg booms are controlled by the truck drivers from pushbutton stations on the ends of the booms. Two 24-in.-wide flat belt feeders are provided for transferring the slack from the bin to the hinged chutes which guide it into the trucks. Like the booms, operation of the belts is controlled by the drivers from pushbutton stations. The weighing incidental to truck shipment is done on 25-ton Toledo dial scales. Linestarters and motors in the preparation plant are Westinghouse, with the exception of Master gearmotors on the degradation elevator and conveyor and the flat-belt slack feeders (P. & H. "Milwaukee" boom hoists not included).

Power for the Crapo mine is purchased from the Consumers Power Co. at 33,000 volts. Transformer equipment (Kuhlman) is as follows: three 200-kva. 33,000/2,200-volt primary units, supplying the secondary units, hoist motor

and two 150-kw. synchronous motor-generator sets (one to be installed) furnishing 275-volt direct current for underground use; three 37½-kva. 2,200/440-volt transformers supplying the tippie motors and miscellaneous loads on the surface; three 37½-kva. 2,200/220-volt transformers for a.-c. equipment underground (pumps, etc.); and one 7½-kva. 2,200/110-volt lighting transformer. Two 2,000,000-circ. mil "Okoloom" cables suspended in pipes in the hoisting shaft serve the underground d.-c. system, which employs Anaconda 4-0 figure-8 trolley wire and Ohio Brass overhead fittings and arc-welded rail bonds.

In addition to the tippie and truck-weighing station, the surface plant includes a wash house with facilities for 300 men, a timber yard and an office building, in which also are located the supply room, repair shop and hoist room. The latter also houses the motor-generator sets and control panels.

The Consolidated Coal Co. also operates the Randall and Wolverine No. 2 mines, each with a daily capacity of 1,000 tons; R. Perry Shorts is president. George C. Eastwood is vice-president and general manager; Otto Schupp, treasurer; Thomas B. Jones, secretary and assistant treasurer; Roy T. Lyons, operating superintendent; and W. H. Russell, mechanical superintendent. Robert Johnson is superintendent of the Crapo mine.

Connected Horsepower, Crapo Tippie

Equipment	Horsepower
Shaker screen and picking table...	25
Lump storage conveyor	15
Movable trough, lump storage conveyor	5
Weigh baskets (2)	10
Degradation conveyor	5
Degradation elevator	3
Lump and egg loading booms (3) ..	15
Slack loading feeder belts (2).....	6
Total	84*

*Exclusive of boom hoists.

BITUMINOUS PRODUCERS

+ Appraise Plans for the Future

At National Coal Association Meeting

TWO MAJOR QUESTIONS—"How has bituminous coal met the problems growing out of the departure from time-honored methods and practices in the past years?" and "What shall be the future course of the industry?"—shaped the proceedings at the 15th annual meeting of the National Coal Association, held at Washington, D. C., Oct. 26-27. Measures for protecting present markets and securing new ones were surveyed with an eye to their value in offsetting both old and new influences tending to restrict the use of coal, and the convention, reflecting the industry's satisfaction with progress under the bituminous code, approved a proposal (p. 415) for legislation to continue acceptable features for two years or until a permanent basis of recovery is attained.

The fairly good going under the present control system should not excuse failure to initiate necessary changes, warned C. E. Bockus, retiring president, in sounding the keynote of the convention at the opening session, with Charles A. Owen, president, Imperial Coal Corporation, presiding. "Up to the present time, more than 90 per cent of all those engaged in the industry have benefited by this program of control," and it is not surprising, therefore, that many oppose any change. "If all were living up to the code this *status quo* plea would be more convincing." And even if enforcement were 100 per cent, there is yet no definite evidence that code provisions and price stabilization will be continued.

A return to free and unrestricted power over wages, hours and prices would start the industry directly toward "strikes, disorder and bankruptcy," and therefore is unthinkable, Mr. Bockus asserted. Paying his respects to the sales agency plan, he expressed the opinion that if other organizations similar to Appalachian Coals, Inc., had been functioning, Congress might approve cooperation between districts, with the government

sitting in to protect the consumer. But, whatever the proposals offered, charting the best course for the industry requires their careful consideration.

Preoccupation with code affairs and the continuing depression has slowed down the organization of Bituminous Coal Research, Inc., reported John C. Cosgrove, president, West Virginia Coal & Coke Corporation, and chairman of the association's organization committee. Nevertheless, sufficient funds (p. 416) have been secured to warrant a modest start.

Educational efforts of the Committee of Ten—Coal and Heating Industries are yielding results in the promotion of solid-fuel use, declared Marc G. Bluth, executive secretary, pointing to the distribution of 50,000 bulletins to producers, retailers and equipment men and the successful consummation of projects covering: establishment of boiler and setting heights; the Chicago smoke survey, carried out by the CWA; organization of fuel conferences at the University of Illinois; and the highly successful 1934 World's Fair smoke-abatement exhibit.

"Greater in number and more varied in character than those of any similar period since the World War" was the characterization applied to questions coming before the government relations committee by Chairman Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc. His report and specific recommendations were adopted without a dissenting vote. On the debit side of the ledger, Mr. O'Neill placed the adverse decision on the \$2 duty on bituminous coal from Germany and Great Britain; repeal of the countervailing duty on soft coal, restoration of which should be a future task of the committee; and certain income tax provisions in the Revenue Act of 1934, inserted over the protest of the association. The organization, however, was successful in its fight against a provision of the lumber code requiring coal-mining companies to purchase



J. P. Williams, Jr.
New President, National Coal Association

all lumber used above ground from retailers, and in preserving to coal companies operating sawmills for their own purposes the exemption from lumber-code assessments and reports.

The right to protection against any weakening of the competitive position of bituminous coal with relation to fuel oil, natural gas and hydro-electric power through code operation has been consistently maintained by the association, said Mr. O'Neill, but in spite of these efforts and in the face of administration assurances that no injustice would be permitted, "no adequate measures for its protection have yet been taken." Administrator Ickes continues his unsuccessful efforts to regulate the petroleum industry through production instead of price control, as advocated by the association, and the even more unfair natural-gas competition continues unchecked without even a code, let alone one containing the fair-trade practices, including prohibition of sales below cost of production and distribution, demanded by the bituminous industry.

Introduction of proposed legislation for a federal tax of 5c. per M, for which NRA support was sought, was prevented by the drawing out of negotiations—suggested by a natural-gas representative—for the determination of fixed price relationships, which finally failed, except in the Southwest, due to the gas industry's demands not only for retention of present markets but for a larger share of the business. "No improvement in relationships between the two industries has been achieved," and drastic action is necessary. The federal government, the committee recommended, should be requested to support a tax on natural gas, and interstate nat-

ural-gas lines should be brought under federal control.

Continuation of the educational campaign against "the extravagant allotment of the taxpayers' money to uneconomic hydro-electric plants by PWA and other federal agencies" was urged by Mr. O'Neill, who stressed the fact that numerous bills for additional water-power developments are sure to be offered in the next Congress and pointed out that administration objectives for the coming year include "increased funds for the Tennessee Valley development and the expansion of similar projects in other sections of the nation."

Protests against the proposed increase in coal freights, which Mr. O'Neill estimated would average nearer 25 than 20c. per ton—the carriers' figure—will be continued, but the industry should seriously consider a policy toward truck regulation. Rail carriers stated that legislation regulating truck movement will be sought, but, if they are to raise the delivered price of coal by increasing transportation cost, "are we then to favor measures which will deprive us also of cheaper truck transportation?"

Development of a truck policy was formally recommended to the association's board of directors after a discussion centering on the seriousness of the problem and the difficulty of developing a definite program. Regulation was favored by many, but in one or two instances approval was qualified by a suggestion that previously held ideas might have to be modified in case freights were increased. On the other hand, the willingness of the carriers in some sections to grant rate concessions to check trucking was cited as justification for holding to a conservative policy. Enforcement of code regulations on mines supplying truckers also was offered as a means of removing their chief weapon: lower prices.

The place of credit organizations and sales agencies in the coal picture was the theme of the second session, with R. H. Sherwood, president, Central Indiana Coal Co., presiding. "Correct credit information," said W. J. Magee, president, National Coal Credit Corporation, "is vitally important for the proper conservation of assets"—particularly accounts receivable.

"No law of Washington or elsewhere, however that law may or may not complement it, provides a substitute for a sales agency set up by the voluntary action of a group of coal producers to market their product," declared C. B. Huntress, president, Appalachian Coals, Inc., in discussing the organization and operation of the agency (*Coal Age*, August, 1934, pp. 311-13; September, pp. 348-52). ACI's function, he pointed out, is to place the product of its producers in the best markets and obtain the best prices the market will pay. Thus it fits in with the modern



Charles E. Bockus
Retiring President,
National Coal Association

trend of business toward large-scale endeavor, and is in no sense promotive of monopoly or monopolistic practices. Formation or contemplated formation of other agencies is a good omen, and Mr. Huntress suggested the possibility of joint action in the future. However, "legal opinion is divided as to the right of such agencies to correlate prices among themselves. That question could be settled by legislation giving such right by specific exemption from the anti-trust acts."

While the code has somewhat limited its effectiveness, members participating in Northern Coals, Inc. (*Coal Age*, October, 1934, pp. 390-93), feel that they have secured a measurable degree of profit and that sales agencies are necessary, even under code operation, reported H. L. Findlay, vice-president, Youghiogeny & Ohio Coal Co. Work is going forward on a proposed agency in western Kentucky, said C. F. Richardson, president, West Kentucky Coal Co. Mr. Sherwood disclosed that

Consummation of the proposed federal hydro-electric program will retard, rather than promote, recovery, delegates to the 15th annual meeting of the National Coal Association held in formally approving a resolution condemning the St. Lawrence project and the power program of TVA and other government agencies as ultimately resulting in a reduction in employment, dislocation and destruction of private industry, direct losses to the coal and related industries and imposition of new and unnecessary burdens on taxpayers.

Continued support of safety work was formally approved in another resolution, while a third measure urgently recommended that sufficient funds be appropriated to restore the U. S. Bureau of Mines to a condition of greater usefulness in making the lives of mine employees safer.

a committee is at work in Indiana, and D. A. Thomas, president, Montevallo Coal Mining Co., stated that recognition of the necessity for an operating agency in Alabama by the time the code expires had resulted in revival of plans discontinued last year in favor of the code.

Officers and directors were elected at the 15th annual meeting of the National Coal Association as follows:

President—J. P. Williams, Jr., president, Koppers Coal & Transportation Co., Pittsburgh, Pa., succeeding C. E. Bockus, president, Clinchfield Coal Corporation, New York.

Vice-presidents—Heath S. Clark, president, Rochester & Pittsburgh Coal Co., New York; R. L. Ireland, Jr., vice-president, Hanna Coal Co., Cleveland, Ohio; and C. F. Spencer, president, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan.

Treasurer—Col. W. D. Ord, president, Empire Coal & Coke Co., Alexandria, Va. (reelected).

Executive secretary—John D. Battle, Washington, D. C. (reelected).

Directors at large—L. T. Dee, vice-president, Lion Coal Corporation, Ogden, Utah; R. H. Knode, president, Stonega Coke & Coal Co., Philadelphia, Pa.; J. F. Macklin, president, Monroe Coal Mining Co., Philadelphia; Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc., New York; W. L. Robison, president, Youghiogeny & Ohio Coal Co., Cleveland, Ohio; S. A. Scott, president, New River Co., Macdonald, W. Va.; Brooks Fleming, Jr., Consolidation Coal Co., Fairmont, W. Va.

Alabama—D. A. Thomas, president, Montevallo Coal Mining Co.

Indiana—C. G. Hall, general manager, Walter Bledsoe & Co.

Iowa—Robert E. Lee, president, Consolidated Indiana Coal Co.

Kansas—C. F. Spencer, president, Pittsburg & Midway Coal Mining Co.

Western Kentucky—C. F. Richardson, president, West Kentucky Coal Co.

Michigan—George C. Eastwood, vice-president, Consolidated Coal Co.

Montana and Wyoming—Harry L. Gandy, president, Sheridan-Wyoming Coal Co.

Ohio—William Emery, Jr., president, Cambridge Collieries Co.

Pennsylvania—Crawford Madeira, Madeira, Hill & Co., and Charles A. Owen, president, Imperial Coal Corp.

Strippers—F. S. McConnell, vice-president, Enos Coal Mining Co., Cleveland, Ohio.

Virginia—C. E. Bockus, president, Clinchfield Coal Corporation (ex-officio for six terms), and D. D. Hull, Jr., president, Virginia Iron, Coal & Coke Co.

West Virginia—O. L. Alexander, president, Pocahontas Fuel Co., Inc., and J. D. Francis, president, Island Creek Coal Co.

COAL DIVISION, A.I.M.E.

+ Studies Mine Water, Light and Gas Evolution

At State College

MEANS whereby the acid discharged by mines in their effluents have been reduced, electric lamps been improved and cutting machines and loading equipment been adapted to pitching beds were described in a two-day session, Oct. 19 and 20, of the Coal Division of the American Institute of Mining and Metallurgical Engineers, held in the Mineral Industries Building, Pennsylvania State College, State College, Pa. Coal combustion, scientific management and wage negotiations also held the floor. About 300 persons were present.

At the session of Friday morning, Oct. 19, H. E. Nold, professor of mining engineering, Ohio State University, presided. Beginning in December, 1933, declared J. W. Paul, mining engineer, Pittsburgh, Pa., much money was expended in Pennsylvania, Ohio and West Virginia in the exclusion of air from abandoned mines to prevent acidification of mine water. In Pennsylvania, the operations until June 1, when the counties took on the work, were under Mr. Paul, and at one time 1,242 men were employed. The CWA spent about \$100,000, the State about \$55,000 and the SERB about \$25,000 in that State. The number of openings ultimately to be trapped or closed has been estimated between 5,000 and 16,000, as a mine may have not only many openings but many surface cracks and cave holes and some of the latter are larger than drifts.

R. D. Leitch, associate chemical engineer, Bureau of Mines, was quoted by Mr. Paul as declaring that impounded acid water can be rendered neutral or alkaline only when sufficient alkaline water enters the mine to neutralize the acid, but that sealing an abandoned mine to air will prevent the formation of more acid.

Mine entrances were not dammed tight but merely sealed against entry of air, except that tops of shafts were closed in places to keep animals and human beings from falling into them.

Mineral Industries Building,
Pennsylvania State College



Closing against air suffices, and damming may cause disaster if a mine is opened in a lower seam of coal. Sealing mines, said Mr. Paul, is less expensive than the treating of water made necessary by the acid mine drainage, disregarding damage to river craft, locks and dams, piers and foundations, and household plumbing.

In 42 selected mines in Pennsylvania, West Virginia and Ohio, 3,504,000 gal. per day was discharged before sealing, 1,421,000 gal. after sealing. The acid discharge before sealing was 72,632 lb. per day and after sealing was 20,664 lb. Many abandoned mine openings remain to be sealed, and a period of years would be needed for completion of the work, and thereafter there would be much expense for maintenance.

Dangers from sewage where the water is freed from acidity was stressed by E. A. Holbrook, dean of engineering, University of Pittsburgh, in a written discussion presented by C. E. Lawall, dean of mining, West Virginia University. Acidity in the Ohio River has extended to Marietta, Ohio, declared B. F. Hatch, assistant engineer, State Department of Health, and may be extended further if not controlled. Sealing still continues under local control financed by the FERA. Open shafts are dangerous. Small mines, opened up throughout the coal fields by farmers, were likely to increase acidity.

No less than 3,000,000 tons of coal is being taken yearly from small truck mines in Ohio, said Mr. Nold; 50 per cent of the coal entering Columbus has that origin.

Entrances to 450 mines have been closed on abandonment in Choctaw and

Cherokee Indian reservations, where mines are leased for the Indians by the U. S. Government, said H. I. Smith, chief, mining leasing division, U. S. Geological Survey. There, mines are sealed to exclude water and to prevent coal fires caused by burning brush and moonshiners. Many persons who have mysteriously disappeared are believed to have fallen into abandoned shafts. From the depths of an open shaft, 200 ft. from a school, dead dogs and cows were dragged.

Advantages of the electric cap lamp, said Graham Bright, Mine Safety Appliances Co., are safety in gas and dust, absence of fire hazard, greater illumination than with open-flame lamp, steady light within working shift, no adjustment during shift, clean reflector, no air pollution, no consumption of oxygen, no appreciable heat, and low operating costs.

Tungsten filaments designed for reasonable life have a temperature of 2,500 deg. F. With a vacuum bulb, the tungsten evaporates and blackens the inside of the glass, thinning down the filament, increasing resistance, reducing current and wattage and cutting down the quality of light during its life 20 to 40 per cent. If the bulb is filled with an inert gas like argon, temperature can be raised 200 to 300 deg. for the same life with little evaporation of tungsten. Blackening of bulb and loss in light during the life of lamp is then only about 3 per cent, with marked light increase, but to attain these advantages the current rating must be 0.6 amp. or more.

No greater development, said T. G. Fear, assistant to the president, H. C. Frick Coke Co., has been made in the

coal industry in the last fifteen years that in mine lighting. At one of his mines, 22 tons was picked on the picking table daily, and two months later only 15 tons was picked on the same table, the better illumination afforded having enabled the miners to clean their coal more effectively. Safety probably has been increased even more than efficiency, especially in transportation, for the electric lamp does not go out. With carbide lamps, 40 minutes is lost each day replenishing lamps.

Attainable ratings of both pulverized coal and grate firing are determined by the reactivity of the fuel in its coked form, said M. A. Mayers, Coke Research Laboratory, Carnegie Institute of Technology, at the afternoon meeting, over which J. C. Haddock, president, Haddock Mining Co., Wilkes-Barre, Pa., was chairman. With pulverized fuel, the limit seldom is reached; a practical limit is set by the speed of the active burning process, which is practically independent of the characteristics of the fuel and depends only on the mechanical arrangements for firing. The physical aspects of combustion were described by Mr. Mayers, as also by Percy Nicholls, supervising engineer, fuel section, U. S. Bureau of Mines, in an article by the latter on fuel beds. In discussing the fact that coal remained longer on the grate of an underfeed stoker than on the grate of an overfeed stoker, R. A. Sherman, fuel engineer, Battelle Memorial Institute, declared that this explained the greater tendency to clinkering on the former.

Machine mining at the Salem Hill mine was described by George Jones, mining engineer, Haddock Mining Co., Wilkes-Barre, Pa. An account of these operations appeared in *Coal Age*, July, 1934, pp. 263-266. Today, instead of making chute openings between haulageway and airway in the hopper shape described in the article, openings are narrow throughout and slope toward the longwall face.

Slanting of the face causes the machine to hug the face excessively, said Mr. Jones, so jack pipes are set a little away from the face, which runs about 30 deg. from the pitch. Chain pillars are being left between the levels to give temporary support, to afford an airway and also to keep back water which might come in quantity from the upper level. These chain pillars may be recovered later. Sometimes the longwall face is lost after traveling between 100 and 500 ft.

Asked by William Reed, Fife Coal Co., Scotland, whether he drew props and thus obtained relief, as was customary in Scotland, he said none was withdrawn. He did not believe the props resisted the movement of the roof, which was so weak that they penetrated the clod, but not up to the hard strata, because the clod between the props filled up the goaf and prevented that degree



John T. Ryan

of movement. Falls occurred mostly at top end and not at one-third of the way to top, as in Mr. Reed's experience.

With gas evolution in coal mines, nothing is so certain as its uncertainty, said N. P. Rhinehart, chief, West Virginia Department of Mines. A mine that had little gas gave pressures of 21, 42 and 44 lb. in three holes 10, 20 and 30 ft. long, drilled 80 ft. from the advancing face, in a mine where the cover was 1,000 ft. In another case, holes in a very gassy mine of length varying from 15 to 102 ft. at varying distances from the working face showed, for the greater part, less than 7 lb. pressure. The maximum pressure of 29 lb. was recorded in a hole 71½ ft. deep. The 102-ft. hole showed only 6½ lb. Holes drilled in ribs showed a lower pressure than shallower holes drilled nearer the advancing face. Evidently, the coal bleeds gas readily, and original pressures can be secured only by deep holes in advance of working faces. Gas flows from hole to hole where the holes are in close proximity. Holes drilled into top or bottom failed to register pressure, indicating that, in the Pocahontas

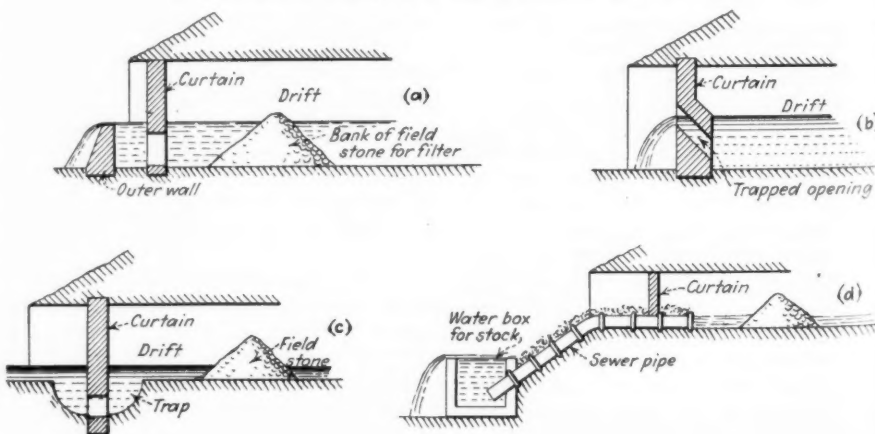
region, the source of methane comes exclusively from the coal. Probably, the only way to ascertain original pressures would be by drilling from the surface into the virgin coal.

Gas increases or decreases with rapidity of production. Double-shifting or intensive production from the more gassy area frequently liberates more methane than the ventilating current can safely remove, requiring curtailment of operation or complete shutdown of area involved, though double- or triple-shifting, in general, does not increase quantity of methane per ton mined. Gas is discharged in greatest volume per ton mined from development work, in lesser volume from rooms and still less from pillars. Quantities as great as 2.25 cu.ft. per minute per daily ton produced have been recorded from an entire mine in the developed area, requiring over 225 cu.ft. of air per minute per daily ton mined to bring the methane percentage in the main return down to 1 per cent. Though barometric pressure modifies rate of liberation, other conditions are far more determinant. Maximum evolution for the day's operation may be 100 per cent greater than the minimum.

In the Tesla tunnels, said Robert Currie, district engineer, anthracite district, U. S. Bureau of Mines, gas evolution has no relation to speed of advance. Blasting is a greater cause of gas evolution than cutting or loading, because it breaks up the coal and releases an immense quantity of gas. In Indiana, when coal is being shot by shotfirers, the gas percentage is abnormally high.

Shrinkage of coal results from loss of methane, declared C. E. Lawall, director, school of mines, University of West Virginia, and this shrinkage causes further gas evolution. Gas migrates in solid coal distances up to 2,000 ft. and 2,200 ft., as has been proved by the travel of ethane from capped gas wells in West Virginia. In Belgium, 22 per cent of volatile matter in coal has been found to be the percentage at which gas evolution is most active. The same seems to be true of this country.

Four Ways of Trapping Mines to Prevent Entry of Air



A dinner at the Nittany Lion Hotel, with Dr. R. D. Hetzel, president, State College, as toastmaster, was held in the evening, at which John T. Ryan, Eli T. Conner, chairman of mining section; A. B. Parsons, secretary, A.I.M.E.; H. N. Eavenson, president, A.I.M.E., and J. W. Finch, director of U. S. Bureau of Mines, spoke. Problems of mining are becoming more and more difficult, making need for more technical men, said Mr. Parsons. Legislators had been disposed to advocate that the Bureau of Mines' appropriations should be cut commensurably with the decrease in mining activity, said Dr. Finch; they failed to recognize that when the mining industry is depressed it needs more help than ever.

At the session of Oct. 20, J. C. Cosgrove, president, West Virginia Coal & Coke Co., presided, and A. Ramond, Chas. E. Bedaux Co., Chicago, discussed the application of scientific management to mining. This was followed by a discussion of F. S. McConnell, vice-president, Enos Coal Mining Co., which company has used such principles sub-

At the dinner the following were nominated as the new officers of the Coal Division:

John T. Ryan, vice-president and general manager, Mine Safety Appliances Co., chairman;

Eugene McAuliffe, president, Union Pacific Coal Co., vice-chairman;

Edward Graff, general manager, New River Co., executive committee man;

Thomas Moses, president, H. C. Frick Coke Co., executive committeeman;

David Ingle, president, Ingle Coal Co., executive committeeman.

These names will be voted on by members by letter ballot.

ject to certain limitations imposed by conditions. Thereafter consideration was given to "Engineering and Operating Data Which Should Be Considered in Wage Negotiations," but this discussion, with many leading men as participants, was kept off the record.

OHIO SECTION A.I.M.E.

Surveys Values of Preparation Plants

MEETING at the Belmont County Country Club, St. Clairsville, Ohio, Oct. 12, the Ohio section of the American Institute of Mining and Metallurgical Engineers discussed coal washing and its possibilities.

Dr. H. E. Nold, professor of mining engineering, Ohio State University, introduced the chairman, W. E. Lewis, chairman of the board, Jeffrey Manufacturing Co., who declared that the coal industry had acquired new vigor from the NRA but even more from district sales agencies. The coal industry would do well to follow the lines of the American Iron and Steel Institute in correlating information and experience.

Coal-cleaning mathematics, said B. M. Bird, Battelle Memorial Institute, has suffered from assumptions which rendered it inaccurate. One rarely deals with a simple fluid like water but with mixtures of water and impurities, nor with simple hindered settling, because on the air table, for instance, the coal is crowded by banking bars, which densify the fluid medium. In the Robinson washer are not only upward but horizontal currents resulting from the action of stirring arms. Large sizes can be cleaned, especially in jigs if intermediate sizes raise the gravity of the

suspensory medium. Horizontal current is more effective in separation than vertical. The Battelle Memorial Institute proposes to tackle the mathematical theory of cleaning with a more complete picture of the complex conditions obtaining.

Greater capacity can be obtained with continuous than with pulsating current. If fine coal is used as a medium for increasing gravity, the unit in which it is used cannot be required also to wash the fine coal. That material must be washed independently. Recognition must be given to the classifying value of the suction stroke in jigs. Between the draws in a launder washer, the bottom of the bed is stationary. An adequate bed of refuse is thus obtained. Most of the treatment occurs at the draws. On the other hand, with the table, the material is completely mobile.

By the Link-Belt Simon-Carves preparation plant at Fairpoint, Ohio, said R. V. Clay, vice-president, Hanna Coal Co., who read the address of A. C. Dettrick, preparation manager of that company, mechanization operations in the mine had been made possible. Discrimination between coal and refuse could not be attempted with mechanical loading; to obtain efficiency in such

loading, all partings had to be loaded with the coal. The preparation plant was essential in making that separation which could not be attempted in the mine, and it did its work so well that the ash in the coal could be kept below 7½ per cent. Coarse coal was cleaned in the first two cells and fine sizes in the other three.

In the absence of C. W. Ferree, mining engineer, Wheeling Township Coal Mining Co., W. F. Hazen, general superintendent, read an address declaring that the cleaning of the No. 8 seam in Ohio was not justified by the operating economy of a steam plant resultant from such cleaning, in view of the expense of cleaning and the loss of much coal having 50-per cent ash. He believed that the cost of power-plant maintenance was not considered in the making of specifications. Ash in the coal he had found helpful in the operation of his Somers power plant. In later discussion many questioned this conclusion.

Keeping entry coal together and slowing up the tipples while it was passing was the practice at Fairpoint, said J. H. Richards, mining engineer, Hanna Coal Co. Mr. Richards' remarks covered ground which will be described in the next number of *Coal Age*.

In discussion, C. W. Lotz, Hanna Coal Co., regretted that the use of the hand jig for testing coal was not more general, as it gave an excellent separation. Every coal is different and every plant has its own problems, so there is no such thing as a best preparation plant, said J. B. Morrow, preparation manager, Pittsburgh Coal Co. Mr. Hazen had talked of 50-per cent ash in the reject, but 50-per cent ash does not mean that mineral matter is 50 per cent. It is 1.02 times the ash plus five-eighths of the sulphur. If the percentage of ash is 60 per cent, the mineral-matter content of the coal may be 77 per cent. Freight saved by excluding mineral matter from shipped coal is a large consideration, but change in fusing characteristics of ash also is important.

The Crucible Steel Co., said H. J. Nelms, general superintendent, Ohio & Pennsylvania Coal Co., speaking about the relatively clean Pittsburgh coal, could not find any saving in pig-iron production by further refinement of the coal when the ash was down to 8 per cent and 1.25 per cent of sulphur. Experiences at Clairton, as related by H. W. Seyler, chief chemist, Clairton Coke Works, Carnegie Steel Co., showed that cleaning of coal was a paying proposition, said William Griffen, manager, Koppers-Rheolaveur Co., quoting an article in *Coal Age*, June, 1933, pp. 187-194. It decreased shattering of coke and decreased the breeze, hence more coke could be made from raw coal. The reduction in coke consumption has been 5 to 8 per cent per ton of pig iron and that of flux 5 to 10 per cent.

MONTHLY COST SHEETS

+ As a Byproduct of Ledger Postings

By JOHN C. McNEIL

Certified Public Accountant
McVeigh, Ky.

NO SMALL PART of the value of monthly cost sheets as a tool of management lies in the speed with which they are made available to the executive and operating heads of the company. If payrolls must be checked, voucher records analyzed, ledgers posted and trial balances taken off before work on the cost sheet can be started, speed is out of the question. By reversing the process, however, and building the costs up to the ledger instead of tearing down and analyzing ledger accounts, compilation of the cost sheet can be expedited materially. Moreover, this method also will simplify ledger posting.

This reversal can be accomplished by using the operating report form shown in Fig. 1. On the first sheet of this form

—the one illustrated—all direct mining costs are entered. The breakdown of costs is shown in Table I. The second sheet (assuming that the number of mines is not too great for entry of direct cost items on a single sheet) covers the costs set out in Table II and is identical in form with Fig. 1. The third sheet, also identical in form with Fig. 1, covers the items shown in Table III. With this system, only the items in Table I are allocated to individual mines.

These forms constitute a summary of entries from every book of original entry, consolidated so that there is only one posting to each general ledger account for the month—and that posting from one instead of several sources. As these monthly summaries are balanced

out before entry to the ledgers, trial-balance troubles are eliminated. From this report—the only one which should be required from the mine office—the main office can make all postings to the general ledger.

The report consists of twelve columns; eleven columns represent books of original entry and the twelfth column a consolidation of the figures shown in the preceding eleven. Debits are entered in black ink and credits in red in the column covering the particular book of original entry. If properly handled, the footing of each column at the bottom of page 3 of the report will be a "zero" balance. Accounts 75 to 99 (Table I) cover items of direct cost

TABLE I

DIRECT MINING COSTS— MINE NO. —

Acct. Nos.	
75	Machine mining
76	Shooting
77	Loading coal
78	Yardage and deadwork
79	Haulage
80	Drainage
81	Ventilation
82	Timbering
83	Slate and cleaning up
84	General lubricants
85	Power
86	Superintendence and time-keeping
87	Dumping and tallying
88	Loading and preparation
89	Repairs—Mining machines
90	Repairs—Mine locomotives
91	Repairs—Mine cars
92	Repairs—Tracks and wires
93	Repairs—Substations and lines
94	Repairs—Mine building, etc.
95	Repairs—Tippie equipment
96	Repairs—Pumps and drills
97	Repairs—Telephones, etc.
98	Repairs—Mine tools
99	Other direct costs
Total Direct Costs Mine No.—	

TABLE II

INDIRECT EXPENSES

100	Executives salaries
101	Office salaries
102	Office Supplies and expenses
103	Engineering salaries and wages
104	Engineering expenses
105	Legal and auditing expenses

Acct. Nos.	
106	Association dues
107	Telegraph and telephone
108	Stationery and printing
109	Freight, express and drayage
110	Interest
111	General insurance
112	Compensation insurance
113	Taxes
114	Shop expenses—Labor
115	Shop expenses—Supplies
116	Purchasing and handling
117	Repairs—Office buildings
118	Repairs—General equipment
119	Repairs—Autos and trucks
120	Depletion
121	Depreciation—Buildings
122	Depreciation—Machinery and equipment
123	Depreciation—Autos and trucks
124	Depreciation—Other
125	Royalties
126	Traveling expenses
127	Safety and sanitation
128	Retirement of capital assets
129	Other general expenses
Total Indirect Expenses	

SELLING EXPENSES

135	Officers' salaries and expenses
136	Sales salaries and expenses
137	Other office salaries and expenses
138	Advertising
139	Miscellaneous selling expenses
Total Selling Expenses	

COMMISSARIES

150	Salaries and wages
151	Light, heat and power
152	Telephone and telegraph

Acct. Nos.	
153	Administrative
154	Taxes
155	Insurance—General
156	Insurance—Compensation
157	Repairs—Buildings
158	Repairs—Equipment
159	Repairs—Autos and trucks
160	Miscellaneous commissary expenses
Total Commissary Expenses	

CLUBHOUSES

170	Salaries and wages
171	Groceries and provisions
172	Household supplies
173	Laundry
174	Taxes
175	Insurance
176	Repairs—Buildings
177	Repairs—Equipment
179	Depreciation—Buildings
180	Depreciation—Equipment
181	Miscellaneous Expenses
Total Clubhouse Expenses	

TENEMENTS AND DWELLINGS

190	Repairs—Buildings
191	Repairs—Streets, walks, fences
192	Sanitation
193	Insurance
194	Taxes
195	Depreciation
196	Miscellaneous expenses
Total Tenements Expenses	

TABLE III

REVENUES

50	Coal Sales—Commercial
51	Coal Sales—Employees
52	Commissary sales
54	Tenement rentals
55	Light and power revenues

Acct. Nos.	
57	Clubhouse revenues
Total Revenues	

LOCAL PURCHASES

62	Commissary merchandise
63	Materials and supplies

ASSETS AND LIABILITIES

1	Impressed cash
2	Bank accounts
3	Accounts receivable
4	Notes receivable
5	Interplant transfers
25	Accounts payable
26	Accrued payrolls
27	Accrued salaries
28	Unredeemed scrip
29	Unclaimed wages
30	Accrued royalties
31	Accrued taxes
32	Accrued interest
33	Accrued expenses—Miscellaneous

RESERVES

35	Reserve for depletion—Mineral
36	Reserve for depletion—Timber
37	Reserve for depletion—Development
38	Reserve for depreciation—Buildings
39	Reserve for depreciation—Equipment
40	Reserve for depreciation—Autos and trucks
41	Reserve for depreciation—Livestock
45	Reserve for compensation—Insurance
46	Reserve for other insurance

Fig. 1—Monthly Operating Report (Original Size, 15x19½ in.)

With this system in use, monthly cost sheets can be made up either at the mine or general office. Preparation of these sheets becomes merely a matter of transcribing the figures from the operating report forms. The amount shown in the "Labor Distribution" column of the operating report should be shown in the "Labor" columns on the cost sheet. By subtracting "Labor" from the "Total" columns, supply costs can be derived. Most important is the flexibility of the system; it can be used with equal facility by a company operating one mine or by a company operating a hundred.

"IPTs Incoming" and "IPTs Outgoing" are inserted to cover transfers between plants of the same company

"Cash Received" takes care of cash receipts at the mine office. Various accounts, as shown in the cash-received

NOTES

. . . from Across the Sea

AS HAS BEEN occasionally surmised, incombustible dusts are by no means of equal value in rendering dust inexplosive. Thus, if 60 per cent of the mine dust is anhydrite, CaSO_4 , the dust will be harmless, whereas if the incombustible dust is gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, 40 per cent will suffice, and if it is magnesium sulphate heptahydrate, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, 27½ per cent is all that is needed, according to the twelfth annual report of the (British) Safety in Mines Research Board, 1933 (British Library of Information; price 61c.). The report does not say that the gypsum and magnesium sulphate heptahydrate are decomposed by the heat of the explosion and that the water thus liberated has to be evaporated, but asserts that an incombustible dust seems to be effective in preventing the propagation of a coal-dust explosion mainly by reason of its capacity for absorbing heat, which is exceptionally great for water, whether chemically combined or free.

Not less than 67½ per cent of sodium bicarbonate, HNaCO_3 , the report adds, is required to be present if an explosion is to be prevented, which is more than of any of the other three. It is difficult, the report declares, to understand the comparative inefficiency of sodium bicarbonate, seeing that it liberates 11 per cent of water and 26 per cent of carbon dioxide on decomposition by heat. The value of some dusts, however, is decreased, says the Board, by their disposition to cake and thus resist dispersion; and, to prevent such caking, talc, or stettite, has proved the most effective agent when added in small quantities.

At low temperatures (68 deg. F) the moisture absorbed by dust, whether of coal or of incombustible materials, is roughly double that at the relatively high temperature of 86 deg. F. It will be easy, therefore, for American engineers to visualize how much greater it would be at 55 deg. F., the usual temperature of mines in the United States.

Though an increase of moisture decreases the dispersability of all dusts, it is more effective in doing so with some dusts than with others. It appears that those dusts which are most readily dispersable when the distributing force is weak are not necessarily so when the force is strong. The more important dispersability probably is that resulting from a small force in the initiation phase of an explosion, as the Board states, but in estimating the value of the incombustible dust in a barrier the dispersability with a strong force may perhaps also sometimes be the more important factor. It has been found that when

limestone is used, of which only 25 per cent will pass through a 200-mesh (I.M.M. standard) screen, 20 per cent more inert dust is needed than when a dust is used so fine that 85 per cent will pass a 200-mesh screen.

Turning to chemical inhibitors of explosive combustion, the Board finds that some increase incendency with one source of ignition and decrease it with another. Among the inhibitors may be listed phosphorus oxychloride, ethyl iodine, isoamyl bromide, phenyl bromide, aniline, carbon tetrachloride, dibromo benzene, ethylene dibromide, lead tetraethyl and iodine.

DANGER from sparks mechanically produced is now definitely apprehended in Great Britain, and instances of such sparks have been noted in the removal of steel arches. When steel, rendered brittle in rolling, is broken by a falling weight, the Board discovered, whitish blue flashes occur, though when a glancing blow is struck only yellowish sparks are formed. It has not been found possible to ignite firedamp by blows of metal on metal, but the blow of a pick against rock, or of one piece of rock against another, can ignite firedamp if the rock is a hard sandstone. Such ignitions can be prevented, says the Board, only by efficient ventilation.

ROPES are capeled, or socketed, the Board finds, with the aid of tin, antimony and lead in varying proportions. About 51.1 per cent of the sockets are estimated to be socketed with mixtures containing over 30 per cent of tin, 14.3 per cent with mixtures incorporating 5 per cent of tin, 27.1 per cent with mixtures of which tin forms only 2 per cent, and 7.5 per cent with mixtures containing copper. In contrast, the general practice in this country is to use zinc. Babbitt, a copper alloy, has been quite generally condemned in this country, so it is interesting to note that the Board declares that "copper-bearing metals show an arrest point in the neighborhood of 400 deg. C., and require to be heated well above this temperature before they are fluid enough to pour; thus they are likely to overheat and weaken the rope wires and should not be used."

Tests were made on the castability of the alloys, using a temperature of 350 deg. C., and it was found that with 31 per cent of tin, 9 of antimony and 60 of lead, the alloy hardens in a shorter distance of travel than when it contains 5 per cent of tin, 15 of antimony and 80 of lead. The Board also declares that the tinning of wires is not necessary, be-

cause there is frictional resistance on a bare straight wire of 700 lb. per square inch and might be three times that on a curved wire. But, it adds, the wires must be free from grease and might well be cleaned with emery cloth to advantage. Moreover, rosin may be used as a flux to improve adhesion.

The conclusion reached by the Board is that the 31 per cent tin alloy is more difficult to work than the 5 per cent, though sockets, when properly made with it, draw less than those of the 5 per cent alloy. The latter alloy is more fluid than alloys containing either greater or less percentages of tin and is capable of making satisfactory sockets for colliery hoisting ropes of all sizes.

FURTHERMORE, the Board found that wood tar used as a rope dressing was of very high acidity and that the acid would react with iron filings in the presence of water. As the fiber of the core contains hygroscopic moisture, this type of dressing gives rise to internal corrosion. Mineral oil, also, used as a dressing, has about one-twentieth as much acidity as wood tar and seems to have no corrosive action on steel even in the presence of moisture. Examination of a number of ropes has shown that corrosion in this type of ropes does not increase rapidly until the lubricant has been pressed out. Raw fiber without oil will attack steel at a rate proportional to the acidity natural to the fiber, which acidity is said to be due, according to the report, to bacterial decomposition of some of its constituents, but moisture must be present or no corrosion will occur. However, the fiber will eventually absorb moisture. When the acid of the fiber attacks the steel, the resulting product is broken up by the moisture forming a mixture of iron oxide and regenerating the acid. Lubrication protects the rope by impeding this latter action. Observation seems to show that oil fills up the cells of the fiber but does not affect the cell walls, which latter will absorb moisture. Samples of fiber were vacuum-dried and impregnated with oil, but after exposure to the air of the laboratory for a week, the moisture content was again normal, or about 10 per cent. Even the presence of oil did not prevent the absorption of moisture. Why not then fill up the cell walls with some moisture-resistant material, leaving the cells themselves open for the reception of oil? For this purpose, a solution of Bakelite in alcohol was used, reducing the moisture content to 5 per cent. Thus treated the fiber did not corrode the steel, but it was found the fiber became very brittle and lost its tensile strength when deprived of moisture.

There remains the possibility that an impermeable skin could be provided about each fiber which would leave the cell walls free to receive oil and permit the fiber to have the desired moisture. This possibility is under investigation. If only the bacterial action could be prevented, without introducing acid, the problem might be solved in that way, but that also seems impossible and is

not suggested. Sterilization by heat and gas prior to oiling might meet the problem, but how long would it be effective and how could it be performed without depriving the fiber of the moisture it needs?

SMALL animals, such as birds and mice, have been used for the determination of the vitiation of the air in mines by carbon monoxide. Unfortunately for the value of the determination, it has been found that these animals become acclimatized to such atmospheres, so that the Board finds they are able to live normally in atmospheres containing 0.15 to 0.30 per cent of carbon monoxide. In such acclimatization the percentage of reticulated blood cells is markedly increased and both heart and spleen are developed, but only in certain cases. The enlargement of the spleen occurs when there is no increase in the red-cell count, and the enlargement of the heart where the blood count is increased.

INVESTIGATIONS are still being made by the Board to discover the various bodies out of which coal is com-

posed. Experiments on the extraction of coal by solvents have shown that a mixture of xylene, $C_6H_4(CH_3)_2$, and amyl alcohol, $C_5H_{11}OH$, has a greater extractive power than either constituent. But it has been found that much of the apparently extracted material was actually formed by synthesis from the solvent mixture, the coal causing a combination of the constituents which could not occur without the presence of coal or some other catalyst to assist in the reaction. All of which shows how careful must be any conclusions drawn from such solubilities. A ball mill has been provided to grind coal very fine under a vacuum. The product will be used to ascertain the quantity of extract that can be obtained with solvents. Fischer and others in Germany and R. S. Asbury, working on Edenborn coal in this country, have shown that a reduction in the particle size of the coal increases the quantity of extract. This finely ground product has been termed Fischer mu-coal.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Investigation of Warm-Air Furnaces and Heating Systems, Part VI, by A. P. Kratz and Seichi Konzo. Bulletin No. 266, Engineering Experiment Station, University of Illinois, Urbana, Ill. 128 pp. Price, \$1.

This bulletin describes studies made in cooperation with the National Warm-Air Heating and Air-Conditioning Association, in design of ducts for forced-air heating, velocities of air in ducts, room-temperature gradients, pressure losses in ducts and filters, control systems, furnace bonnets and baffling, warm-air registers, air washers and heat emission.

Studies indicate that without dampers a forced-air heating system will fail to afford a proper heat supply and temperature balance between rooms, that ducts as small as 3x10 in. in conjunction with large ducts are undesirable because of the excessive temperature drop in the former, that a high bonnet over a radiator furnace and large ducts at the bonnet equalize air temperature at bonnet outlets, that "gravity" action during any off-periods of the fan interferes with the ventilation of the second and third stories of a building.

Velocities as high as 1,200 ft. per

minute in a forced-air system usually will distribute air noiselessly so long as abrupt directional changes and restrictions are avoided; with such changes and restrictions the air may be noisy even when the mean velocity is reasonable. Much higher capacity and furnace efficiency may be obtained with a forced-air system than with a gravity plant, but this is not reflected in fuel saving.

Fuel consumption is practically independent of air circulated or type of control. With continuous fan operation, temperatures are 1 or 2 deg. F. higher near the floor than with a gravity plant, and, with intermittent fan operation, ceiling temperatures are nevertheless about 1 deg. F. lower than with such a plant.

High side-wall registers with ordinary grilles with low air velocities give high air temperatures above the 5 ft. level, especially with intermittent fan operation. The velocity with such registers should not be less than 500 ft. per minute. Louvers that deflect such air at 45 deg. downward produce objectionable air currents. Baseboard registers with common grilles should not be operated with air velocities at the register of over 300 ft. per minute, but

with louvers inclined 15 deg. downward, air velocities of 500 ft. per minute are permissible.

Nature of metal and thickness of wall have little, if any, relation to heat transmitted from metal to air. Bright metal transmits much less heat than rusty, painted or insulated metal unless insulation is at least $\frac{1}{4}$ in. thick.

Proceedings of Coal Division, American Institute of Mining and Metallurgical Engineers, 1934, Vol. 108. New York; 495 pp.

This volume is notable for its contributions on rock-dusting by Henry F. Hebley; on coal-land valuation by several authors; on caving chambers by J. W. Paul and J. N. Geyer; on bumps by T. L. McCall; on coal classification, the determination of coal characteristics and the uses of coal by many authors. Articles are classified under mining, preparation, classification, evaluation of coal for coke, utilization, coal-land valuation and economics. The institute has selected the most important papers, had them revised and condensed, and in some cases rewritten, so the reader will find that the papers appearing in the volume are of a high order of merit.

Azimuth Determination, by E. F. Codrington. Bulletin No. 79. Engineering Experiment Station, Ohio State University, Columbus, Ohio. 74 pp. Price, 50c.

This publication, the production of the professor of geodetic engineering at the Ohio State University, goes forth with the benediction of William Bowie, of the U. S. Coast and Geodetic Survey. It has three chapters: (1) The Celestial Sphere and Methods of Computing Time; (2) Azimuth From the Sun, and (3) Azimuth From Polaris, with ten tables and essential spherical trigonometry. No calculus is used.

Mine maps should be based on the true meridian and more care should be taken to ascertain the correct azimuthal direction. As it is now, maps of different companies do not agree, and the surveys of two companies must be corrected if a tunnel is to be laid out between them or their operations are to be correlated. Consequently, this bulletin should be found of much value to mine surveyors.

Coming Meetings

International Acetylene Association; 35th annual meeting, William Penn Hotel, Pittsburgh, Pa., Nov. 14-16.

West Virginia Coal Mining Institute; 27th annual meeting, Fairmont Hotel, Fairmont, W. Va., Nov. 16 and 17.

Harlan County Coal Operators' Association; annual meeting, Harlan, Ky., Nov. 21.

Monongahela Valley Coal Mining Institute; eighth annual banquet, Dec. 8, Hotel Morgan, Morgantown, W. Va.

OPERATING IDEAS



From Production, Electrical and Mechanical Men

Maintenance Problems Hold the Stage At Institute Meeting

MAINTENANCE hints were a major feature of the September meeting of the New River & Winding Gulf Electrical & Mechanical Institute, held at Mt. Hope, W. Va. Included in the discussion were the following subjects:

Alloy-Steel Bolts—Old equipment, such as mining machines and locomotives, on which certain bolts consistently give trouble due to breakage, can be improved by substituting heat-treated alloy-steel bolts in place of the original fastenings, declared John S. Beltz, chief engineer, mining department, Jeffrey Mfg. Co. Manufacturers of alloy-steel bolts are in position to furnish any size and type of bolt, cap screw or stud required, as well as nuts, which, of course, should be proportioned to have the same strength as the bolt or stud.

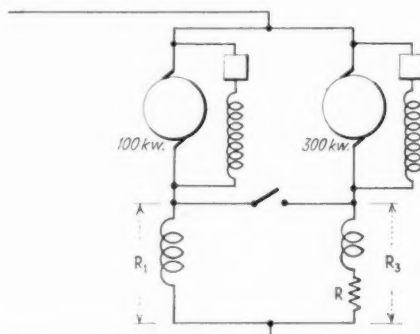
Asbestos Coils—Lack of a thorough understanding of the characteristics of asbestos insulation is one of the chief difficulties encountered with locomotive and mining-machine armatures at certain mines. The superior ability of asbestos insulation, as compared with cotton, to withstand extreme temperatures was not questioned. Apparently, difficulties have arisen out of the fact that asbestos does not have the inherent strength and will not soak up or "take" insulating varnish to the same degree as cotton.

Cotton insulation impregnated with varnish creates a high dielectric strength to ground and between turns or layers. The coil made of asbestos-covered wire should be further insulated with mica to insure proper dielectric strength. Factory coils insulated with asbestos and mica sometimes are damaged by the armature winder when he is accustomed to handling the more pliable cotton insulation. Heating the stiff asbestos-and-mica coils reduces the possibility of damage when the coils are being forced into place.

Commutation at Low Speeds—Difficulties due to commutator-bar flashing that in some cases resulted in shorts and burned

armature coils in locomotives rewound to operate at a lower speed were reported by several chief electricians. Because in certain instances the difficulty was eliminated or minimized by changing from undercut to non-undercut armatures, it was obvious from the discussion that the difference apparently is due to a lack of speed and centrifugal force sufficient to keep the slots free of carbon.

Whether, in any of the cases, brushes with higher abrasive characteristics have been applied to the motors being operated



Compound Generators in Parallel.

without undercut mica was not brought out. According to the general principles governing the selection and operation of carbon brushes, it is to be expected that sparking difficulties caused by high mica will develop if the best grade of brush for an undercut commutator was retained after the change in undercutting practice.

Discussion also brought out a possible explanation of the apparent increase in burned coils from "bugs" between the bars. The armature rewound for a lower speed has a higher resistance through the coils connecting adjacent bars and therefore the current across a short between bars would be limited to a lower value than with the

original winding. In certain cases, the current might not be high enough to burn out and clear the "bug," and therefore would continue long enough to heat the coil to the point of damage or destruction.

Glider-Shoe Life—Service trials at various mines have resulted in a wide difference of opinion among mining men as to the merits of the glider shoe as a current-collecting device for heavy locomotives, particularly as to the relative wear on the collector and the wire when using gliders and shoes, respectively, rather than to the fact that the locomotive cannot be back-poled when using the shoe. A possible explanation for the wide variation in glider life at various mines was offered by Mr. Beltz. Use of the glider, he explained, requires a trolley wire with a smooth surface, which cannot be maintained if both wheels and gliders are used on the same wire. Even the infrequent operation of wheel-equipped gathering locomotives over the main line is sufficient to disturb the ideal condition for gliders.

Relative service life of shoes and wheels also is affected by wire lubrication or its lack. Practically all comparative tests show greatly reduced wear on gliders when the wire is lubricated, and this applies even when trolley wheels are used.

Lubricating Locomotive Wearing Surfaces—Certain wearing surfaces on mine locomotives may be far better off without oil or grease, Mr. Beltz observed. If a locomotive is operating where the rails are heavily sanded, the wear on journal boxes and guides will be less if oil is not applied to these surfaces. The lubricant in this case serves only to hold the sand and thus forms a grinding compound.

Oiling Trolley Wheels—Tests now under way at the mines of the Gauley Mountain Coal Co., Ansted, W. Va., indicate that trolley wheels equipped with graphite bushings will last many times longer if never oiled, declared W. T. Dalton, chief electrician. Original practice required regular lubrication. Mr. Dalton's opinion was echoed by Mr. Beltz, who said that if oil is to be used it is better to employ a plain bushing, as oil appears to soften the graphite and increase wear. Manufacturers of graphite bushings recommend that no oil be applied.

Paralleling D.C. Generators—Connecting

shunts across series fields is not an effective way to parallel direct-current generators, said L. W. Scott, electrical engineer, General Electric Co., in a discussion of maintenance of substation equipment. Adding a shunt to the series field of a unit which takes too much load does reduce the field current in that unit but at the same time it has the effect of lowering total resistance from equalizer to bus, thereby taking some of the current from the series field of the underloaded unit.

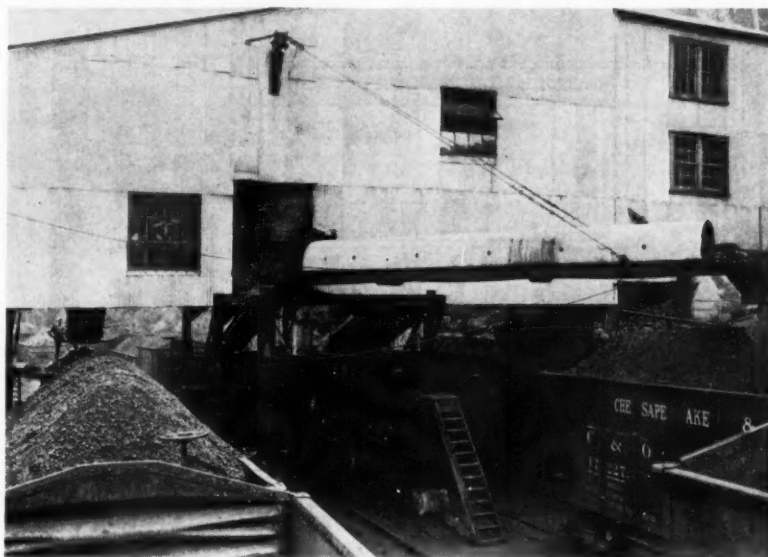
The most effective method is to add a resistance in series with the series field of the unit which takes more than its share of the load, as indicated by *R* in the accompanying diagram. For a correct condition, the resistances of the series field circuits from equalizer to bus, *R1* and *R3*, should be inversely proportional to the capacities of the units. For example, with 100- and 300-kw. units, the resistance of *R1* should be three times that of *R3*. The strength of the commutating fields affects the operation, but it may be possible to overcome their effects by a slight shifting of the brushes on one or both machines. Modern generators will commute satisfactorily with the brushes slightly displaced from neutral.

Mine-Car Lubrication

Under ordinary circumstances, the mine-car greases that have proved most successful are lime-soap products free from organic fillers and compounded from well-refined mineral oils ranging in viscosity from 200 to 600 seconds at 100 deg. F., according to opinions expressed by O. L. Maag, lubricating engineer, Timken Roller Bearing Co., in a paper on lubricants for industrial anti-friction-bearing applications presented at a meeting of the National Association of Lubricating Grease Manufacturers, Chicago, Oct. 16-17. The higher viscosity oils generally produce the most stable products.

The old type of plain bearings for mine cars, said Mr. Maag, usually were lubricated with black oil, but since anti-friction bearings have come into use in this service grease lubrication has become necessary. "The anti-friction bearings are inclosed in housings which should be filled with medium-consistency grease, the lubricant serving as an additional seal to prevent water and dirt from entering the housings. In order to counteract the harmful effects of both water and dirt, it has been advisable to recommend the use of heavier greases than are desirable for the low frictional loads in the bearings. These greases often are heavier than mine-car operators like to use for easy application of the lubricant, but the improved operating conditions and decreased costs soon reconcile them to the change. The type of grease that has proved most successful for this service is the lime-soap or water-repellent grease of medium to heavy consistency.

"However, in cases where the mines are dry, it is not necessary to use a water-repellent grease. In some of these dry mines there are long hauls above the ground, these hauls being several miles in length, at high speeds, and downgrade. This ne-



Mounted Above the Center Track, This Swinging Boom Is Long Enough to Allow Slack to Be Loaded on the Tracks on Either Side.

cessitates the use of brakes, which give rise to high bearing temperatures, causing the usually specified lubricant to melt and run out. In applications such as this, it has been necessary to use a high-melting-point soda-soap grease."

Swinging Boom Adds Three Slack-Loading Tracks

Increasing demand for a better prepared coal in the past few years has resulted in the adoption of a number of methods of increasing, in effect, the number of tippie loading tracks. A loading boom arranged to swing across three tracks is one of the outstanding methods

It's Easy

Special writing ability is not necessary in the submission of material for use in the Operating Ideas section. The range of possible ideas covers operating, electrical, mechanical and safety problems, and both short items and those of greater length and more detail on short cuts to higher efficiency, reduced cost and greater safety are welcome. Elaborate presentation is not required, as it is the idea that counts. Sufficient description in simple language to bring out the details, plus a sketch or photograph if it will make the idea clearer, is all that is necessary. So send in your ideas. They will have careful consideration and each acceptable one will net the sender \$5 or more from *Coal Age*.

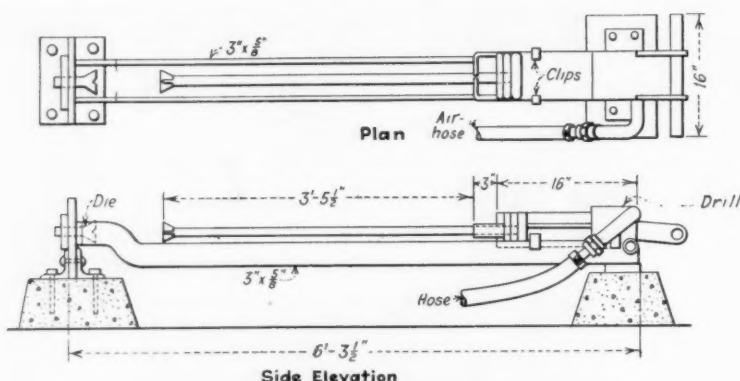
of increasing loading facilities at low cost, yet it is one that so far has been applied at only a few mines. One of these is the Anjean mine of the Leckie Smokeless Coal Co., in the Greenbrier field of West Virginia, and the illustration shows the boom in place.

The Anjean mine was opened in 1928 and the tippie originally was built with four loading tracks and a corresponding number of loading booms. One of the tracks also was equipped with a slack chute. Later, it was found necessary to add vibrating screens to the plant equipment, thus increasing the quantity of slack loaded. To take care of this increase and guard against blocking off cars, a swinging boom was installed on the upper, or empty, side of the tippie.

The boom is a belt conveyor 18 in. wide and 30 ft. long between pulley centers. A pivot at the back end and guy wires attached to the front end are points of support. The guy-wire attachment at a high point on the tippie includes a lubricated sleeve arranged so that it can turn from side to side to prevent bending the wires when the boom is swung from track to track. Height of the discharge end of the boom is sufficient to top the cars and provide clearance, and the boom is shifted from track to track by adjusting manila guy ropes, which are retied at the anchor points on the tippie after shifting is completed.

Sharpeners for Drill Steel Employs Drill Itself

Equipment for sharpening pneumatic-drill steel employing a drill itself as a part of the sharpening procedure has been worked out by the blacksmith at the Ravenscroft (Tenn.) mine of the Tennessee Products, Inc. Details are shown in the accompanying illustration, supplied by A. W. Evans, chief mine inspector, Nashville. The drill rests directly on the guides and is held in place



Construction Details, Drill-Steel Sharpener.

by clips on either side. The frame is made of 3x8-in. strap, and the equipment can be made and assembled by any smith, Mr. Evans declares.

Lengthening Chain-Drive Life

Observance of five simple principles will add much to the life of chain drives, improve service and reduce the possibility of interruptions, a recent issue of the *Link-Belt News* points out. Quoting from the *News*, these five principles are as follows:

"Proper Lubrication"—Be sure that sprocket wheels are in line on the shafts. If the sprockets are not in line, a side pull develops which concentrates the load on the sides of the sprocket teeth and on one side of the chain. This results in excessive wear on both chains and sprockets.

"Proper Adjustment"—The chain should be run just a little slacker than a belt—about as shown in the accompanying illus-

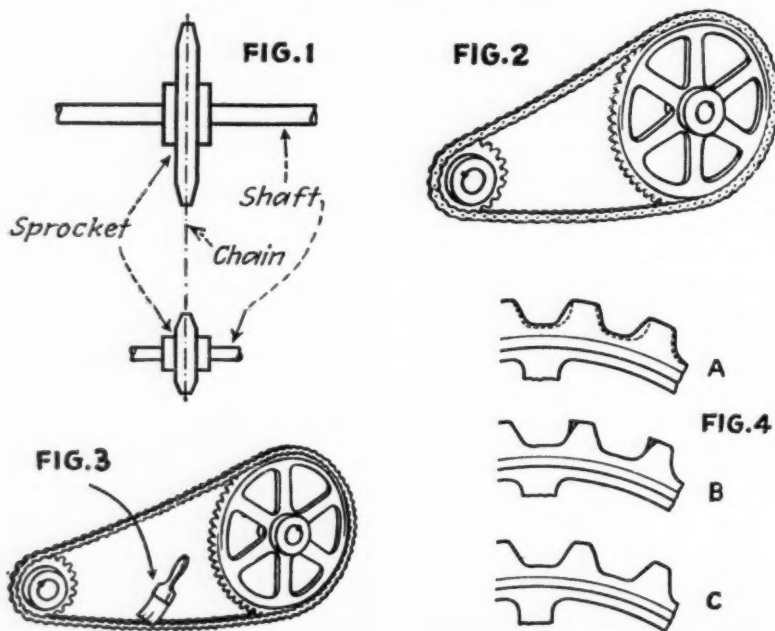
tration (Fig. 2). Too much tension causes undue wear on the chain and excessive bearing friction. Excess slack may allow the chain to jump the sprockets or ride the teeth and break.

"Frequent Lubrication"—Chains not running in oil should be lubricated at frequent intervals. A good grade of light cylinder oil should be used. A paint brush is a good thing for applying oil to the chain joints. Paint open joints on the open (upper) side. Oil closed-joint chains on inside (upper side of lower run—Fig. 3).

"Frequent Cleaning"—Drives not running in oil should be cleaned regularly. Take the chain off and clean it well by soaking and dipping in kerosene. Dry well and oil thoroughly before starting up again. Before laying up machines clean the chain and oil it with a heavier oil or grease. When it is to be used again, reclean and oil with a light oil.

"Well-Fitting Sprockets"—Look at the sprocket wheels from time to time to make sure that they are not worn enough to in-

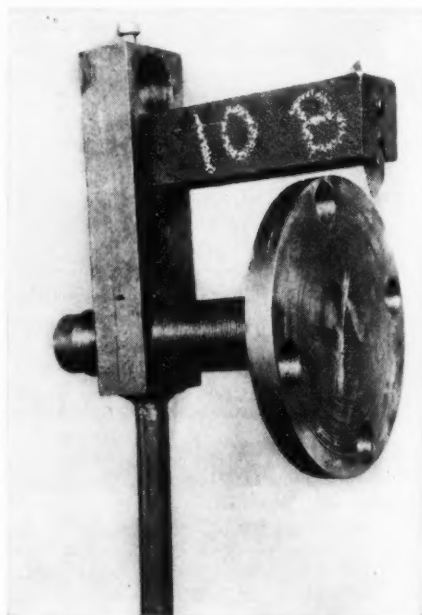
Fig. 1—Illustrating Proper Alignment. Fig. 2—Illustrating Proper Chain Tension. Fig. 3—Oiling Closed-Joint Chains. Fig. 4—(A) Hook Shape Developed on Driving Side, Preventing Freedom of Action; (B) Remove Shaded Portion by Grinding to Secure Improved Operation; (C) Used Sprocket After Removal of Hook.



jure the chain. Worn cast-tooth sprockets can be improved by grinding the teeth as shown in the illustration (Fig. 4). Grind away the shaded section as in B. This will result in smoother action between chain and sprockets. If the teeth are badly worn, the wheels should be replaced with accurately made and close-fitting sprockets."

Special Tool Facilitates Turning Crankpin

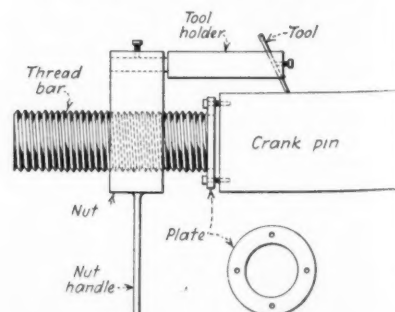
Faced with the problem of truing up an out-of-round generator crankpin which had been cast integrally with the crank, Bennie Dukes, machinist, Gibraltar Coal Mining Co., Central City, Ky., developed the equipment shown in the accompanying illustration for accomplishing this particular task, as it naturally was impossible to press out the pin for turning. The thread bar (20 threads per inch) is pressed into the



Special Tool for Truing Up Crankpin.

plate attached to the end of the crankpin and carries a specially made nut, into which the tool holder is pressed, the latter being bored as shown to receive the tool. To true up the pin, the nut is revolved by means of the handle.

Shows How Crankpin Is Trued.



WORD from the FIELD



Coal Presses War on Other Fuels; TVA Policies Under Fire

Intensification of the opposition to the power program of the TVA brought the policies of the organization to issue before two State regulatory bodies in October. Both the Alabama and Tennessee public service commissions held hearings on plans to purchase properties of the Alabama Power Co. in northern Alabama and of the Tennessee Public Service Co. in and near Knoxville, Tenn. The Alabama hearings were featured by a clash over the question of the commission's jurisdiction over TVA power rates and policies, which ended with an announcement that hearings would proceed whether TVA representatives appeared or not. TVA had stated that directors would testify only if they were assured that their appearance would not be construed as tacit submission to the commission's jurisdiction.

Sale of the Knoxville properties was approved by the Tennessee commission on Oct. 26 without, however, a yielding of State jurisdiction over the properties. Constitutional and legal questions were left to the courts. This action, however, failed to clear the way for TVA, as the State supreme court on Oct. 29 refused to set aside a circuit court order temporarily restraining the sale. Execution of the proper bond relieved the higher court of authority. Deadline for the consummation of the sale was midnight, Oct. 30, under the terms of a bondholders' agreement to sell.

One item in the PWA power program which has been under continuous fire from the bituminous industry and miners since its inception was definitely crossed off the list in October. As a result of a recheck by a special board of engineers, PWA Administrator Ickes announced that the Verde power and irrigation project in Arizona had been abandoned and a tentative allotment of \$4,000,000 rescinded. Cost of the project was estimated at \$29,000,000, against the original figure of \$19,000,000, while irrigable area was reduced from 85,000 to 50,000 acres. Little prospect existed for marketing additional power.

Using the Verde case as an example, a recheck of other PWA power projects was requested by the National Job Saving and Investment Protection Bureau for the Coal Industry in a telegram to Administrator Ickes on Oct. 12. The bureau pointed to the Loup River (Nebraska) and Casper-Alcova (Wyoming) projects as specific instances where a redetermination of possibilities might show lack of economic justification.

A further protest from the National Coal Association and the United Mine Workers against the use of federal funds for the construction of a diesel-engined municipal power plant at Carbondale was made to the Electrical Power Board of Review of the PWA in October. The city's application originally was denied, then reheard

and now is being considered by the electrical board.

Evidence that the bituminous program is bearing fruit is afforded by a decision to use coal in the new Henryetta (Okla.) postoffice, and in a change from gas to coal at the Okmulgee postoffice in the same State. Coal will be used also in the rehabilitated heating and power plant of the U. S. Veteran's Administration Facility at Hampton, Va., where conversion to a competing fuel was under consideration for some time.

An investigation of pipe-line companies transporting oil and natural gas, particularly the latter, will be undertaken by the Federal Trade Commission, it was reported last month. Construction of a \$1,500,000 natural-gas line from a point near Rosemount, Mont., to Mendota, where a connection with the Minneapolis Gas Light Co. will be made for supplying Minneapolis and vicinity, has been authorized by the Northern Natural Gas & Pipe Line Co., according to reports.

Dixie Bee to Nashville

Nashville Coal Co. interests, operating the Williams Coal Co., western Kentucky, and the Cumberland Coal Co., Tennessee, have purchased the Dixie Bee mine of the Dixie Bee Coal Co., Seifert, Ind., with a daily capacity of 1,000 tons. Originally, it was intended to remove the equipment to western Kentucky, but as a result of a later decision the mine was put into production on Oct. 3.

Power Plants Under Way

Construction of a \$400,000 power plant at Omar, W. Va., to serve the operations of the West Virginia Coal & Coke Corporation was started by the company late in September. Equipment includes one 4,000- and one 3,000-kw. turbo-generator unit, one of which will serve as a standby, although sufficient boiler capacity is being installed to operate both if necessary. Refuse coal will be used as fuel, and it is reported that savings will return the cost of the plant in four years.

R. H. Sherwood, president, Sherwood-Templeton Coal Co., and John A. Templeton, president, Linton-Summit Coal Co., are among the incorporators of the Antioch Power Co., Inc., now constructing a 6,000-kw. power plant at Linton, Ind., to serve the operations of the two mining companies. Equipment includes three 2,000-kw. turbo-generator units.

New Preparation Facilities

New contracts and construction of preparation-plant facilities were reported as follows in October:

BLACK DIAMOND COAL MINING Co., Birmingham, Ala., has completed construction of a new tippie and installation of a larger hoist at its "Sumter" operations in Tuscaloosa County in preparation for an increase in production. The company also is installing two new concentrating tables to supplement the four already in operation at its Whitwell (Tenn.) mine.

BROOKSIDE-PRATT COAL MINING Co., Birmingham, is installing two jigs to add to the capacity of its Blossburg "E" washery.

H. E. HARMAN COAL CORPORATION, Grundy, Va.; contract closed with Roberts & Schaefer Co. for all-steel four-track tippie with electric rotary car dumper, trip feeder, Marcus screen and loading booms; capacity, 450 tons per hour; to be completed Dec. 1.

NEW RIVER Co., Cranberry No. 2 mine, Skelton, W. Va.; contract closed with Pittsburgh Coal Washer Co. for all-steel four-track tippie with chain car haul, two sets of shaker screens and loading booms; capacity, 350 tons per hour; to be completed April 1, 1935.

SCOTIA COAL & COKE Co., Brooklyn (W. Va.) mine; contract closed with Kanawha Mfg. Co. for four-track, five-grade tippie for screening and loading lump, egg, stove, nut and slack; capacity, 150 tons per hour; to be completed Jan. 1.

STEVENS BROS. COAL Co., Garrison, N. D.; construction of complete tippie equipped with shaker screens for making three sizes completed by McNally-Pittsburg Mfg. Corporation; capacity, 200 tons per hour.

UNITED ELECTRIC COAL COS., Fidelity No. 11 mine, Duquoin, Ill.; nine 5x10-ft. (seven single- and two double-deck) "Gyrex" vibrating screens purchased from Robins Conveying Belt Co. through Koppers Construction Co. for use in the new washery now under construction. Capacities range from 12 tons per hour of wet sludge through 50-mesh to 200 tons per hour of wet coal on a 18-in. square-opening deck.

To Study Agency Plan

Study of the possibilities of a sales agency for western Pennsylvania is the task of a committee appointed by the Coal Control Association of Western Pennsylvania. J. T. M. Stoneroad, Carnegie Coal Corporation, is chairman. Other members are: F. B. Lockhart, Hillman Coal & Coke Co.; George H. Love, Union Collieries Co.; Ralph H. Knode, Westmoreland Coal Co.; Scott Stewart, W. J. Rainey, Inc.; Hal E. Booth, Pittsburgh Coal Co.; H. L. Findlay, Youghiogheny & Ohio Coal Co.; H. F. Bovard, Keystone Coal & Coke Co.; and R. E. Jamison, Jamison Coal & Coke Co.

Reorganization of NRA Overshadows Codes; Coal-Price Control Still Stands

THE LONG-PROMISED reorganization of NRA became an actuality last month—and, despite assurances that no attempts would be made to change existing codes by blanket orders or without advance notice and consultation with the enterprises affected, left sensitive industrialists confused and jittery pending definite statement and clarification of administration policies. An address before the National Press Club at Washington by Donald R. Richberg, the new grand marshal of the army of recovery, in which he commented unflatteringly on code price-control provisions provoked a flood of protest, prompt disclaimer that any hasty action was contemplated and official reiteration that the bituminous coal code was still in effect.

In the absence of the official blessing of the Department of Justice on the setup, the price-correlation control system established last June by former Division Administrator Adams (*Coal Age*, July, 1934, p. 291) was continued by an NRA administrative order. NRA also took action on price relationships between Divisions IV and V and on prices in Barbour and Preston counties, West Virginia. Coal men and NRA representatives wrestled with the problem of prices on coal delivered by truck and by water. Divisional and interdivisional meetings to consider price and marketing questions were the order of the day.

Enforcement measures also came in for increasing attention last month. The whole subject was discussed with the President on Oct. 12 at a meeting attended by Attorney General Cummings; Garland S. Ferguson, chairman, Federal Trade Commission, and Mr. Richberg. Election of a new code authority for the retail solid-fuel industry to take the place of the members who resigned in a body on Sept. 1 (*Coal Age*, October, 1934, p. 400) is proposed in an amendment to the code set for hearing on Oct. 29. Under the amendment, drafted by NRA, the industry would elect seven members and NRA would be empowered to appoint three non-voting members.

The wholesale code has been transferred from Division I to Division IV of NRA and is now under the jurisdiction of Deputy Administrator F. A. Hecht. The question of commissions is still a sore point between many wholesalers and producers. Wholesalers object strongly to the regulations adopted by some division and subdivisional code authorities in the mining end fixing these commissions. On Oct. 4, the wholesalers' code authority broadcast a statement, approved by Deputy Administrators Ellis and Hecht, which pointed out that the bituminous code was silent on the question of commissions and that the wholesale code gives the middleman the right to bargain with the producer and to fix compensation by agreement. To this, certain bituminous coal code authorities retorted that their rules on the subject still controlled.

Reorganization plans moved swiftly following announcement of the accept-

ance of the resignation of General Hugh S. Johnson as National Recovery Administrator on Sept. 25. Two days later the President issued an Executive Order creating a National Industrial Recovery Board to administer Title I of the act. S. Clay Williams, A. D. Whiteside, Sidney Hillman, Leon C. Marshall and Walton Hamilton were named as members of the new board, with Blackwell Smith as legal adviser and Leon Henderson as economic adviser and ex-officio members. Mr. Williams was elected chairman and Mr. Marshall executive secretary of the board.

A second Executive Order, amending an order of June 30 creating an Industrial Emergency Committee, designated the Secretary of the Interior, the Secretary of Labor, chairman of the National Industrial Recovery Board, the Administrator of Agricultural Adjustment, the Administrator of Federal Emergency Relief and the director of the committee as members. Mr. Richberg was continued as director of the committee and as executive secretary of the executive council and executive director of the National Emergency Council. The order directs the Industrial Emergency Committee to make recommendations to the President on relief, public works, labor disputes, industrial and agricultural recovery problems, to study and coordinate the handling of joint problems affecting these activities and to determine, with the approval of the President, the general policies of administration of NRA.

According to complaints made by coal interests, the Richberg National Press Club speech of Oct. 4 resulted in buyers in Buffalo, Pittsburgh, Charleston and other cities withdrawing from the market under the belief that price-fixing was to be abandoned. NRA officials promptly repudiated any intention to interfere with the price provisions of any code which was working satisfactorily and Mr. Richberg gave similar assurance to a meeting of the lumber code authority at Chicago. Subdivision chairmen from Divisions I, II and III attending the conference in Washington the following week, adopted a resolution requesting NRA to issue a statement pointing out that all the provisions of the code were in effect and that no changes would be made in the code without a hearing. Under date of Oct. 10, NIRB issued the following statement of policy:

"The Bituminous Coal Code of Fair Competition and all its provisions are in full force and effect. If at any time it should develop that changes should be considered, none will be made by NRA until the industry has been consulted and has been given opportunity to be heard."

The administrative order adopting the Adams plan was signed by G. A. Lynch, administrative officer for NIRB, on Oct. 3, and reads as follows:

It appearing to us that an emergency exists which requires that procedure for the administration of Sec. 1, 2, 3 and 4 of Art. VI of the Code of Fair Competition for the Bituminous Coal Industry be prescribed by

us and that the procedure hereinafter prescribed will tend to effectuate the purposes of Title I of NIRA.

Now, therefore, by virtue of the authority vested in us under Title I of NIRA by Executive Orders of the President, including Executive Order No. 6543-A, dated Dec. 30, 1933, and under Sec. 4, Art. VI of the Code of Fair Competition for the Bituminous Coal Industry, and otherwise, it is hereby ordered:

After the Marketing Committee of a Subdivisional, or Divisional, Code Authority has submitted proposed schedules of prices or changes in effective schedules of prices to its Code Authority and the Code Authority has approved such prices, which approval shall be not later than ten days before the effective date of such proposed monthly schedule of prices, or of such proposed change in such effective schedule of prices, as the case may be, such price schedules and/or changes shall be transmitted (by mailing or otherwise) by such Code Authority to the Deputy Administrator in charge of the Code of Fair Competition for the Bituminous Coal Industry, to each Presidential member and to the secretary of each Subdivisional, or Divisional, Code Authority affected by any such proposed price schedules and/or changes.

Before approval of such schedules and/or changes by the Presidential member of any Code Authority, a meeting of the Presidential members, the chairmen, and the chairmen of the Marketing Committees of all Subdivisional and Divisional Code Authorities shall be held in Washington not later than five days before the effective date of such schedules of prices or changes in such effective schedules of prices, in order that the Presidential members and the National Industrial Recovery Board may at that time exercise the powers vested in them by Sec. 4 of Art. VI of the Code of Fair Competition for the Bituminous Coal Industry and that no such schedule and/or change will be approved by the Presidential members before full opportunity has been given to all interested Subdivisional, or Divisional, Code Authorities to object to any prices therein which such Subdivisional, or Divisional, Code Authorities may consider unfair market prices.

If any matters in controversy cannot be settled promptly through the above outlined procedure, the matter shall thereupon be referred to us for final decision.

This order had been the subject of a number of conferences between representatives of NRA and the Department of Justice during the closing days of September. The original plan was to have the order approved by the Department of Justice and issued by the President as an Executive Order. Failure of the department to give its benediction was reported to be due to the opinion that the department did not have sufficient facts before it upon which to reach a conclusion.

Involved in the controversy between Divisions IV and V was the question of destructive invasion of the normal consuming markets of one district by a competing district paying lower wage scales. Following meetings at Kansas City, Colorado Springs and Chicago, Deputy Administrator Ellis declared it extremely difficult to determine the relative price bases because of meager evidence. But, he added, Amendment 3 to the code specifically provides that Southwestern operators may not sell coal in markets served by producers paying higher rates at prices less than charged by said producers. Upon that basis, he found that prices from the Pittsburg field to affected territory in western South Dakota, western Nebraska and western Kansas should not be less than mine prices on Walsenburg district coal to the same markets. The base price was that for 3x1½-in. nut, with differential adjustments on other prepared sizes on the same basis used by the Arkansas-Oklahoma Smokeless Coal Code Authority. No change was ordered in screenings prices.

In disapproving prices on Preston County (West Virginia) coals, Mr. Ellis recommended that the Northern West Virginia Code Authority "immediately proceed to a proper classification of the Preston County coals, particularly those in the Freeport seam." Pending such reclassification, he concluded that prices on Freeport seam coal should be increased 10c. and on Kittanning and Bakertown seams 15c., with a 15c. increase on Kittanning seam coal from Barbour County. These advances, however, are to be subject to an allowance to Kittanning seam mines paying a 10c. freight arbitrary over district rates applying from other Preston County mines.

Following two days' discussion between NRA officials and representatives of Divisions I, II and III on prices on coal moved by truck or water, arrangements were made for a later meeting between Indiana and Southern high-volatile interests to consider an agreement on prices on coal moving by rail-and-river into Indiana territory. Railroad fuel prices were taken up at a meeting in Chicago between Illinois and Indiana operators and the carriers on Oct. 22, and the next day western Kentucky, Illinois, Indiana, South Dakota and Southwestern producers met to continue correlation parleys. Western Kentucky operators and subdivisional code authority representatives met with Division II spokesmen in Chicago on Oct. 16 to take up delivered price differentials.

The Federal Trade Commission came to the front in the enforcement picture early last month when an attorney-examiner on the Commission staff conferred with Southern Subdivision No. 2 code authorities at Cincinnati, Ohio, on Oct. 4 and then moved on to the mines with a code authority inspector to check up mine records and records of sales agents. The NRA Compliance Council also took action on four cases reported by the same subdivision and an attorney from the litigation division was assigned to aid the code authority in following through. Under date of Oct. 12, NRA announced that the Blue Eagle insignia had been taken away from the Adrian Fuel Co., Upshur County, West Virginia, for violation of the wage and hours provision of the code. Late in October, proceedings were started against the Morgan Coal Co., Belleville (Illinois) district, charging the company with selling at less than code prices.

As a result of the resignation of C. E. Adams, Mr. Ellis has been placed in charge of Division I of NRA. N. W. Roberts has been promoted to Acting Deputy Administrator in charge of the coal section.

Code authority chairmen, Presidential members and marketing committee chairmen of all subdivisions except western Kentucky in Division I have organized themselves as the administrative advisory committee for the division. The committee is divided into two subcommittees, one composed of the Presidential members; the other, the chairmen of the code authorities and of the marketing committees. Headquarters for the committee have been established in the Shoreham Hotel, Washington. The creation of the committee is the outgrowth of the promulgation of the

Adams plan as an NRA administrative order.

Virginia semi-anthracite producers are not subject to the bituminous code, according to a decision by Mr. Ellis announced Sept. 27. The operators who appealed to him for a ruling were the Pulaski Anthracite Co., Merrimac Morgan Coal Co., Great Valley Anthracite Corporation, Blue Ridge Coal Co., Virginia Anthracite Coal Co., and the Pulaski Coal & Briquetting Co. The aggregate annual production of the companies involved approximates 200,000 tons and they employ about 2,000 men. These operations, said Mr. Ellis, "do not come under the provisions of the bituminous coal code; therefore such operators will not be required to comply with any of the provisions of the code and, conversely, cannot receive any of the benefits of that code."



Wayne P. Ellis

Deputy Administrator in Charge of Coal,
Now in Charge of NRA Division I.

Shortly after the bituminous code became effective, Oct. 2, 1933, these operations were placed under the jurisdiction of Southern Subdivision No. 1. Later meetings were held between the operators and the United Mine Workers in an attempt to work out a wage scale, but no agreement was reached. The union demanded a minimum inside basic rate of \$4.20 and an outside rate of \$3.20. The operators stated that it would be impossible to pay these rates and compete with Pennsylvania anthracite. Both sides asked that the question be arbitrated or adjudicated by Mr. Ellis.

Mine operators who run sawmills for mine timber and do not sell any of the product of the mill are not required to contribute to the budget of the code authority of the lumber and timber products industries, in the opinion of the National Coal Association. This opinion is based upon the language of the third paragraph of the recent NRA order terminating the exemption from assessments under administrative order X-36.

The Cotton-Textile Institute has appealed to the Industrial Appeals Board from the decision denying its members who sell coal to their employees exemption from the provisions of the retail

solid-fuel code. The appeal was set down for hearing on Oct. 25. On Oct. 31, a hearing was scheduled on the application of country grain elevators for exemption from the provisions of the same code.

Colorado and Utah operators pressed enforcement programs in late September and October. Barred, for all practical purposes, from recourse to the federal courts as a result of the adverse decision in the Ballard Gearhart case, northern Colorado coal men turned their attention to the State courts and started preparation of cases against a number of violators, including four truck mines in the Fremont district. One item of cheer in October was the voluntary return to the fold of the Clayton Coal Co., which temporarily abandoned code prices to meet alleged competition from the Boulder Valley Coal Co., which had previously gone off the code.

Two new members were elected to the northern Colorado subdivisional code authority in September as follows: Carson W. Smith, Consolidated Coal & Coke Co., vice H. B. Crandell, Clayton Coal Co., and Floyd Pool, McNeill Coal Co., vice M. F. Peltier, Boulder Valley Coal Co.

Wagon-mine operators in three counties in Utah, at a code authority hearing at Price in October, agreed to cease flagrant violations of the bituminous code, thus easing one of the sore spots in the Utah industry. The statement of compliance, however, was accompanied by a request for a price differential. Consideration of this request was refused, the group being advised to file a formal application in writing. Another survey of the wagon-mine situation was started following the hearing to determine whether or not code regulations are being complied with.

Delivered price quoted by a producer must include a sum sufficient to cover cost of transportation and delivery regardless of whether producer owns and operates his own transportation facilities, makes delivery through a subsidiary, engages transportation facilities on a per-ton basis or employs a public carrier, according to a ruling of the NRA Coal Section. Neither can a producer truck to a railroad or river loading point and there sell the coal at the f.o.b. mine price. A producer, however, can, in making sales of coal f.o.b. mine in railroad cars, trucks or barges, stipulate the price at which it will be resold by his purchaser, provided agreed transportation prices are added to the mine price.

Western Pennsylvania producers and retailers found themselves at loggerheads late in September over the question of jurisdiction over shipments, with the result that representatives of the NRA ruled that coal, other than carload lots, comes under the retail code. The producers, including truckers, refused to accept this determination, and plan an appeal to Washington.

Ralph E. Jamison, Jamison Coal & Coke Co., was reelected chairman of the Western Pennsylvania Code Authority at the organization meeting Oct. 1. George H. Love, Union Collieries Co., was again chosen vice-chairman, and B. H. Canon, Fort Pitt Coal & Coke Co., was reelected secretary-treasurer.

Anthracite Insurgents Hit by Decisions; Western Kentucky Injunction Argued

HIT by a series of adverse decisions and rebuffed by the United Mine Workers, which rejected a peace proposal proffered by its officers, the insurgent Anthracite Miners of Pennsylvania decided late in October to take its claim for recognition in the northern anthracite region direct to the President. First intimation of hard sledding for the new union came on Oct. 2 when James A. Gorman, umpire for the Anthracite Board of Conciliation, acting as agent of the National Labor Relations Board in an investigation of insurgent claims of discrimination, reiterated, in a formal notice to insurgent officers, his ruling of July 9 in Case 128 that a solution of the major problem—widespread unemployment growing out of the reduced demand for anthracite—required the consummation of an "honorable peace" between the two unions. This ruling, said Mr. Gorman, was not a suggestion but a decision, and he declared its essentials, including a proposal that disagreements arising in carrying out the decision be submitted to the umpire, have been accepted by the United Mine Workers. Prompt compliance was requested.

Insurgents met in convention in Wilkes-Barre, Pa., Oct. 15, to consider the umpire's suggestion and adopted a plan for an election to determine which union should abdicate. The preliminary step, as set forth in the proposal, was resignation of the officers of both unions and their replacement with provisional officers pending the election, to be held under the direction of a board composed of two representatives of each of the unions and a fifth member to be selected by the Governor of Pennsylvania. The organization receiving the majority vote would take over under the present contract, while the other would disband and liquidate its affairs. A registered letter containing the proposal was immediately mailed to officials of District 1, United Mine Workers, who refused to accept it on Oct. 17. This action was ratified by the executive board on Oct. 18.

Recognition Refused Insurgents

Recognition of colliery grievance committees was denied the insurgents in a decision in the case involving the Exeter colliery of the Lehigh Valley Coal Co., handed down Oct. 9. Irrespective of whether or not the anthracite contract of Aug. 8, 1930, conforms with Sec. 7(a) of the National Industrial Recovery Act, one of the claims of the new union, "The Lehigh Valley Coal Co., or any other coal company signatory to that agreement cannot give recognition to or deal with any committee of the United Anthracite Miners of Pennsylvania, or any other labor organization, save only with committees of the United Mine Workers of America," Mr. Gorman ruled. Following up his previous decision, Mr. Gorman found on Oct. 19, in the East Boston Coal Co. case, that coal companies were within their rights in replacing insurgents participating in the strikes called by the new union, as

they had no "valid contractual or equitable claim for restoration."

Apparent disregard of the terms of the decisions led the umpire to announce on Oct. 20 the withholding of any further decisions in cases which came before the board. Advising the National Labor Relations Board to this effect, he recommended that further releases be held up until the insurgents showed some evidence of a willingness to comply.

With the tide of decisions going against them, the insurgents turned to Washington for aid on Oct. 19, but met with a rebuff from the NLRB, which refused to entertain any proposals until the umpire's findings were accepted. Dissatisfaction with this and other setbacks was reflected in proposals for a strike to force recognition. This weapon was abandoned, however, at a convention in Wilkes-Barre, Oct. 22, which voted to appeal directly to the President.

Developments during the month also were featured by the release of a plan for employing idle miners through federal cooperation in the purchase or financing of 5,000,000 tons of hard coal during the winter. The program was proposed by the fact-finding committee assisting the umpire, and provides for putting 36,000 idle men to work three days per week in the entire anthracite region. These men, it is proposed, would be taken on by the largest line and five largest independent producers at a minimum wage of \$4.62 per day. Reports indicated a lukewarm reception in Washington, however.

The injunction order restraining the NRA from enforcing code wage schedules in western Kentucky was argued in the U. S. Circuit Court of Appeals at Cincinnati, Ohio, Oct. 10. The order was obtained in the federal court at Louisville, May 2, by the Hart Coal Co. and 33 other western Kentucky operators who objected to the \$4.60 scale prescribed in "New Schedule A" of the code. No decision is expected until November, and in the meantime approximately 50 per cent of the western Kentucky tonnage is being produced by United Mine Workers, operators employing union men informally agreeing to continue the terms of the old contract carrying the \$4 scale until a decision is handed down in the injunction case.

The Virginia anthracite region was the scene of a strike of 700 miners on Oct. 1. The men, employed by the Pulaski Anthracite, Virginia Anthracite, Great Valley Morgan and Merrimac-Morgan coal companies, walked out as a result of a dispute over hours and wages. Mines in the field recently were exempted from the provisions of the bituminous code (p. 441). Operations were resumed at all but the Pulaski mine, where a seniority dispute broke out, on Oct. 22, under the terms of a truce agreement whereby the questions at issue will be submitted to the NLRB.

The Whitehead Coal Co., operating a mine at Swords Creek, Va., according

to reports, was directed to begin paying code wages within ten days in a decision handed down by the Division I—South Labor Board in October. The board also directed the Harlan-Wallins Coal Corporation, Verda, Ky., to cease intimidation of its employees, conform to the 7-hour shift and pay overtime due from April 1, 1934. The order asked that enforcement be taken over by the NRA compliance division, and named a committee to determine amounts due individual workers. Company representatives did not appear at any of the hearings.

Decisions in Division II

The Division II Labor Board, in one of its October decisions dealing with a dispute between two groups of employees at the Dixie Bee mine, Seifert, Ind., as to which would take priority in employment under the new ownership (p. 439), ruled that, inasmuch as both groups desired representation through the United Mine Workers, the operator should proceed to negotiate a contract with the usual terms and conditions. Members of each group should have equal consideration in reemployment.

Cutting and loading on the third shift at the Kings Station mine of the Princeton Mining Co., Princeton, Ind., previously submitted to the divisional and National Bituminous coal labor boards, was involved in another decision in Division II in October. Employees who called a strike Sept. 9 on the ground that the company had violated a verbal agreement to discontinue third-shift activities pending a decision by the national board were directed to return to work and submit the controversy to authorities commissioned to handle disputes under the terms of the contract.

Thomas S. Hogan, chairman of the Division V Labor Board, Denver, Colo., was appointed to a similar position in the Division II organization in October, succeeding John A. Lapp, who resigned Oct. 1 to take a place on the Petroleum Labor Policy Board.

A controversy between the Black Diamond Co. and its employees over the rate paid between Oct. 2 and 20, 1933, for coal mined from a 32- to 36-in. seam was decided in favor of the men by the Division III Labor Board in October. The board directed the company to pay 14½c. additional per ton to bring the rate up to 72c., which it stated was the proper wage.

NRA revisions in the Form C report proposed by the operators for gathering information to serve as a basis for determining future wage and price differentials between subdivisions in Division I resulted in a conflict with the Research and Planning Division late in September. The Joint North-South Differential Commission, set up under the terms of the Appalachian agreement, refused to approve the revised forms; Ohio and Pennsylvania operators informed NRA that the information requested constituted "unwarranted and unnecessary interference" with the industry; and northern West Virginia interests refused to turn in the data. As a result, NRA representatives announced that, if necessary, an executive order requiring every mine in the United States to fill out the amended form would be sought.

Protest Opening New Mines For Relief Coal

Reports that State relief administrators were contemplating opening new mines to supply relief coal brought protests from both operators and miners in October. Following the September announcement that there would be no federal fuel relief plan put in operation by the Federal Surplus Relief Corporation this winter, State relief administrators in Oklahoma, Arkansas, Kansas and Missouri were reported to have embarked on plans for opening new operations to supply their requirements. Discussion of similar steps started in Illinois, Tennessee and Alabama.

Anticipating as one result of this movement a reduction in working time at mines already operating, representatives of the National Coal Association, Southwestern operators and the United Mine Workers lodged a protest with the Federal Relief Administrator. Federal funds, it was contended, even when administered by State officials, should not be used to develop new capacity and thus throw trained men out of work to give employment to others. Investigation of the question was promised by the federal administrator, who also contracted to advise State administrators that they are supposed to comply with code requirements in the purchase of relief coal.

Evidence that federal authorities will insist on code compliance in relief-coal purchases is afforded by an announcement of the Coal Section of the NRA governing the handling of relief coal in the Dakotas district reading as follows:

Arrangements have been made with the Federal Surplus Emergency Relief Corporation regarding the purchase of relief coal in the Dakotas district. A letter is to be sent by the Relief Corporation, over the signature of Mr. Hopkins, instructing local relief agencies that all purchases of coal, even from dealers, shall be accompanied by a Certificate of Compliance, stating that the coal was produced in accordance with the provisions of the Bituminous Coal Code. This is considered as an important step in assisting in obtaining enforcement of compliance in the Dakotas in that over 60 per cent of North Dakota's coal production will be relief coal this winter. Violations in this district are numerous and flagrant, and it is believed that this step, together with others being taken by the Division V Bituminous Coal Labor Board will help solve the enforcement problem in North Dakota.

Iowa has requested similar assistance, and the Relief Corporation has assured us that the same steps will be taken in Iowa.

Permissible Plate Issued

One addition to the list of permissible equipment was made by the U. S. Bureau of Mines in September. The approval (No. 269-A) was issued to the Goodman Mfg. Co. on Sept. 24, and covers the Type L9CL3 arc-face cutter with 50-hp. motor, 440 volts, a.c.

New Mine for Indiana

A complete new shaft mine is to be opened by the Snow Hill Coal Corporation in Vigo County, Indiana, five miles northwest of Terre Haute. The seam to be operated is the No. 3, 6 ft. thick, which will be reached by shafts approximately 370 ft. deep equipped with self-dumping cages. Mining methods will be based on undercutting with track-mounted cutters, mechanical loading, 5-ton solid-end steel

cars with safety couplers, storage-battery gathering locomotives, 70-lb. main-line track, trolley-type haulage locomotives and air-conditioned ventilation with automatic control.

Coal will be prepared in a seven-track tippie and washery equipped to handle 500 tons per hour and including dedusting equipment. The Allen & Garcia Co. has been commissioned to design and construct the plant and tippie and preparation equipment will be furnished by the Marion Steam Shovel Co. Samuel Ashby, president, Midland Electric Coal Corporation, Indianapolis, also heads the Snow Hill organization, with C. G. Hall, general manager, Walter Bledsoe & Co., Terre Haute, as vice-president, and E. J. Weimer, Terre Haute, as general manager.

Williamson Aids Research

The Operators' Association of the Williamson Field has joined the list of groups supporting Bituminous Coal Research, Inc., with a subscription based on one-twentieth of a cent per ton on the 1932 production of its membership.

West Virginia Meeting Set

Hand loading onto conveyors, timbering under difficult roof, value of accident records, workings of the bituminous code and electrical power in coal mining are scheduled for discussion of the 27th annual meeting of the West Virginia Coal Mining Institute, to be held at the Fairmont Hotel, Fairmont, W. Va., Nov. 16-17.

Pierce Heads New Company

The Monarch Anthracite Mining Co. has been organized to operate the Mineral Springs colliery under lease from the Lehigh Valley Coal Co. James H. Pierce, president, James H. Pierce & Co., Scranton, Pa., heads the new company. Thomas Dickson and Joseph Eddy, of Dickson & Eddy, New York, are vice-presidents, and Stanley Tuttle, New York, is secretary-treasurer. L. F. Weichel, general manager, Price-Pan-coast and West End coal companies, has been named to a similar position in the new organization.

Safety Meets Held

The Harlan-Wallins Coal Co., Verda, took first honors in the mine-rescue contest at the eastern Kentucky safety meet held late in September at Pikeville. Fordson Coal Co., Stone, won first place in the first-aid contest for white teams, while a colored team from the Inland Steel Co., Wheelwright, beat the field in that division. In the western Kentucky meet, a Gibraltar Coal Co. group took the prize in first-aid work for white teams. The winner in the colored division was a West Kentucky Coal Co. team from Madisonville.

Fifteen teams took part in the second annual West Virginia Coal & Coke Corporation safety meet, Omar, W. Va., Sept. 22. Earling mine was the winner in the white section, with Rossmore a close second. Mine No. 4 took first

honors in the colored section. Mine No. 19 was second.

Koppers Coal & Transportation interests were the winners in the first-aid competition featuring the sixth annual West Virginia safety day at Elkins, Oct. 6. First place in the white division went to the Helen (W. Va.) team of the C. C. B. Smokeless Coal Co.; second to the Eunice (W. Va.) team of the Chesapeake & Ohio Ry. fuel department. The winner in the colored division was the Federal No. 1 team, Federal Coal & Coke Co., Grant Town. Second honors went to the Alloy (W. Va.) team of the Electro-Metallurgical Co.

Personal Notes

E. T. ARCHER, of E. T. Archer & Co., Kansas City, Mo., has been elected president of the Oliver Coal Co., Paonia, Colo., vice the late C. L. Oliver.

C. S. BLAIR, for many years connected with the mining department of the Tennessee Coal, Iron & R.R. Co., has been elected vice-president of the Black Diamond Coal Mining Co., Birmingham, Ala.

A. C. FIELDNER, chief engineer, Experiment Stations Division, U. S. Bureau of Mines, has been elected junior vice-president of the American Society for Testing Materials.

O. P. HOOD has been appointed as the representative of the U. S. Bureau of Mines on the Standards Council of the American Standards Association.

ROY P. HUDSON, formerly with the Elk Horn Coal Corporation, Fleming, Ky., and lately engaged in consulting work, has joined the staff of the Dickinson Fuel Co., Charleston, W. Va., as preparation engineer.

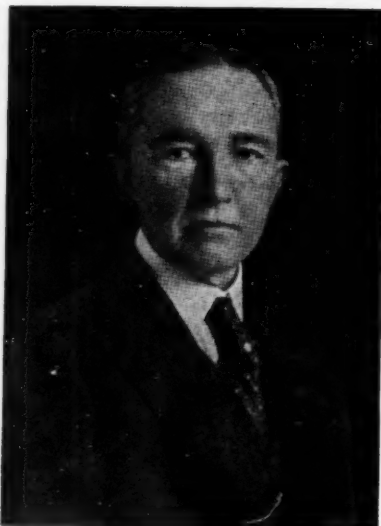
HARRY MOSES, general superintendent, West Virginia division, United States Coal & Coke Co., Gary, W. Va., has been named to a similar position in the Kentucky division and now has charge of all mining operations of the company in the two States.

W. G. POLK, vice-president in charge of operations, has been elected president of the Tennessee Jellico and Block Coal & Coke companies, Knoxville, Tenn., vice Leslie I. Coleman, who died late in September.

E. H. SUENDER, formerly general manager of anthracite operations, Madeira, Hill & Co., has joined the staff of the Consolidation Coal Co., New York, as consulting engineer.

C. A. CABELL, president, Carbon Fuel Co., was again chosen president of the Kanawha Coal Operators' Association at the annual meeting in Charleston, W. Va., Oct. 17, marking the thirtieth anniversary of its organization and the thirtieth year of service of D. C. KENNEDY, executive secretary, who was chosen for another term. Other officers were elected as follows: vice-president, W. C. MITCHELL, Hatfield-Campbell Creek Coal Co.; treasurer, JOHN L. DICKINSON, Dickinson Fuel Co.

H. M. POOLE, president, Norwood-White Coal Co., Des Moines, Iowa, was reelected president of the Iowa Coal



The Late Justus Collins

Trade Association at the annual meeting in Des Moines, Sept. 27. M. G. YOUNGQUIST, Empire Fuel Co., Des Moines, was again chosen secretary.

Obituary

WILLIAM CAMPBELL, 45, superintendent, Gordon Coal Co., Gordon, Colo., was killed Oct. 19 by accidental contact with a high-tension wire.

FRED K. CLARK, vice-president, Hulburt Oil & Grease Co., and an authority on coal-mine lubrication, died at his home in Webster Groves, Mo., Oct. 24. While Mr. Clark's activities largely centered in Illinois in the past ten years, he had a background of wide experience in the coal industry and was a contributor to *Coal Age* on lubrication problems.

JUSTUS COLLINS, 77, identified with the smokeless coal industry in southern West Virginia since 1887 and president of the Winding Gulf Collieries and Lamar Colliery Co., died at Charleston, W. Va., Oct. 18. Born at Clayton, Ala., he resigned a position as secretary-treasurer of the Woodward Iron Co. to organize the Louisville Coal & Coke Co., which opened up the seventh mine in the Pocahontas field at Goodwill, Mercer County. Six years later, he participated in the organization of the Greenbrier Coal & Coke Co., and in 1906 helped organize the Superior Pocahontas Coal Co., which opened up the Winding Gulf field. These interests were consolidated into the Winding Gulf Collieries in 1929, with Mr. Collins as president.

JAMES DALRYMPLE, chief inspector of mines for Colorado, was killed by an automobile while in Florence, Colo., Oct. 10, investigating a fatal mine accident. Mr. Dalrymple, a native of Scotland, started to work in this country as a miner 40 years ago in Pennsylvania, later moving to Colorado, where he worked up to a superintendent's position. He was appointed a deputy inspector in 1907, and was advanced to the post of chief inspector in 1909.

LOUIS COLE EMMONS, president of the sales company bearing his name and for-

mer operator of the Marion Center Coal Mining Co., Emmons, Pa., and the Emmons Coal Mining Co., Bayard, W. Va., died at Philadelphia, Pa., Oct. 26.

CLINTON L. OLIVER, president, Oliver Coal Co., Paonia, Colo., died at his home in Denver, Oct. 3, after an illness of several weeks.

ARTHUR S. WHITE, president, National Fuel Co., general manager, Moffat Coal Co. and chairman of the Northern Colorado Subdivisional Code Authority, died at Denver, Colo., Oct. 6, of injuries incurred in a fall from his bedroom window. Mr. White started his career as a mine surveyor.

"Northern Light" Makes Bow

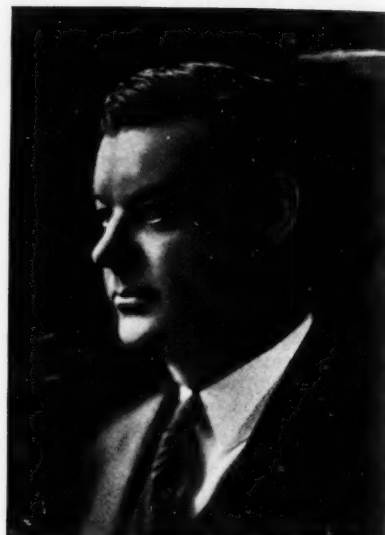
Northern Light, official organ of Northern Coals, Inc., made its bow in October with a 24-page issue devoted to a description of the field originating the agency's coals and discussion of distribution and merchandising of coal, successful retailing, stokers and other general subjects. Declared objectives are assistance to retail coal merchants and consumers and presentation of the products and services of the companies participating in Northern Coals, Inc.

Industrial Notes

AMERICAN ROLLING MILL Co., Middletown, Ohio, has opened a new sales office at 17 Court St. Bldg., Buffalo, N. Y. V. L. CONLEY, assistant manager in the Cleveland district, has been transferred to Pittsburgh, Pa., where he will act in the same capacity for the Buffalo office. Mr. Conley will be assisted by A. W. BRYANT, with headquarters at Rochester, N. Y.

E. W. LAWRENCE, for eleven years connected with the New York sales office, has been appointed Southern representative for the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

ROGER W. ANDREWS, until lately assistant to the president, Blaw-Knox Co., Pittsburgh, Pa., has been appointed man-



The Late Fred K. Clark

ager of the new Western sales division of the Combustion Engineering Co., New York, which includes the Chicago, Detroit, Indianapolis, St. Louis, Kansas City, Houston, Tulsa, Minneapolis and Denver offices.

Mine Death Rate Down

Coal-mine accidents caused the deaths of 65 bituminous and 17 anthracite miners in September, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. This compares with 78 bituminous and 15 anthracite fatalities in August. Based on a production of 27,760,000 tons, the bituminous death rate was 2.35 per million tons in September, against 2.84 in August and 2.88 in September, 1933. The anthracite fatality rate was 4.27 in September, based on the production of 3,977,000 tons. This compares with 4.19 in August and 4.01 in September last year. For the two industries combined the death rate in September was 2.59 per million tons, against 3.00 in August and 3.04 in September, 1933.

Comparative fatality rates for the first nine months of 1934 and 1933, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

Cause	January-September, 1933		January-September, 1934		Total	
	Number killed	Killed per million tons	Number killed	Killed per million tons	Number killed	Killed per million tons
Falls of roof and coal.....	337	1.415	85	2.397	422	1.543
Haulage.....	114	.479	23	.649	137	.501
Gas or dust explosions:						
Local explosions.....	17	.071	8	.226	25	.091
Major explosions.....	7	.029	7	.026
Explosives.....	13	.055	6	.169	19	.069
Electricity.....	39	.164	4	.113	43	.157
Machinery.....	11	.046	1	.028	12	.044
Surface and miscellaneous.....	52	.219	25	.705	77	.281
Total.....	590	2.478	152	4.287	742	2.712
Falls of roof and coal.....	367	1.395	106	2.421	473	1.541
Haulage.....	105	.399	20	.457	125	.407
Gas or dust explosions:						
Local explosions.....	11	.042	10	.228	21	.069
Major explosions.....	17	.065	17	.055
Explosives.....	21	.080	12	.274	33	.108
Electricity.....	43	.163	3	.069	46	.150
Machinery.....	13	.049	3	.069	16	.052
Surface and miscellaneous.....	68	.259	39	.891	107	.349
Total.....	645	2.452	193	4.409	838	2.731

*All figures are subject to revision.



WHAT'S NEW IN COAL-MINING EQUIPMENT

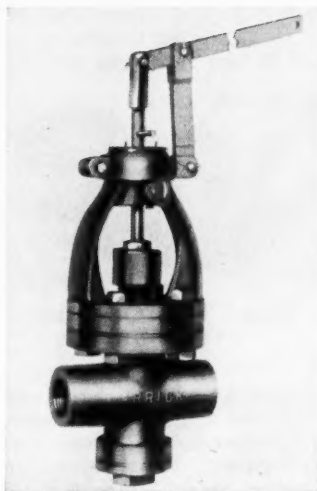
Electric Cap Lamp

Koehler Mfg. Co., Marlboro, Mass., now offers the smaller and lighter Model Q battery for its Wheat electric miners' cap lamps. The battery bears the U. S. Bureau of Mines approval plate, and weighs 47 oz. complete with top. Height is 6½ in.; width, 4⅞ in.; thickness, 1⅞ in. Although considerably smaller than the previous Model C battery, the new type, it is said, will light the same bulb for 14 hours but will give considerably more light, due to its higher average voltage. Where 10 burning hours are sufficient, a more powerful bulb can be used.

The battery employs the "Ironclad" positive plate, which, the company declares, is noted for its sturdy construction and long life. With the shorter work day, the smaller Model Q battery, according to the company, should be able to replace the larger and heavier batteries previously used when the longer work day was standard and yet give close to the same illumination throughout the shift.

Control Valve

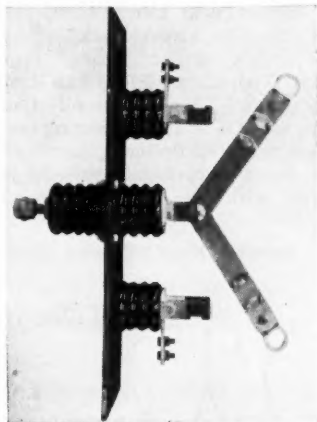
Carrick Engineering Co., Michigan City, Ind., offers the new Type FT No. 1 adjustable "Flo-Trol" valve for controlling the flow of steam and other fluids, such as oil, gas or air. Valve body and all external parts, according to the company, are made of cast hard bronze for ordinary steam pressures and temperatures; for high pressures and temperatures, body and head flange coming in contact with the steam are made of cast steel. The operating lever always is Monel metal and the stem stainless steel. Flange connections can be furnished in addition to the standard screwed connections. Steam passing through the valve does not come in contact with the valve seats, eliminating the effects of wire drawing. The valve generally is controlled by some automatic device which moves the lever to secure a variation of steam flow. Manual adjustments con-



trol the range of speed effected by the movement of the valve lever. These adjustments can easily be made while the valve is in service, the company states.

Disconnects

Delta-Star Electric Co., Chicago, Ill., offers a new line of high-voltage, back-connected-type disconnecting switches



with full-floating double-blade, tongue-type contacts and blade locks. Studs can be equipped with compression-type solderless connectors or can be used with flat-bar or soldered lugs.

Flanged-Head Motors

Louis Allis Co., Milwaukee, Wis., has announced several types of flange-head mountings for its line of electric motors. The flange illustrated, accord-

ing to the company, is an integral part of the motor and may be finished on either or both sides. The equipment is recommended by the maker for use on close-coupled pump mountings and other applications, including machine tools, where space limitations may make it desirable to eliminate motor feet.

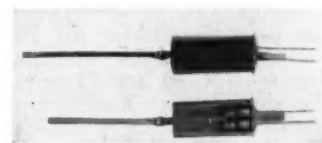
Electrical Aids

A number of improvements in the G. E. Thrustor—a self-contained combination of motor-driven centrifugal pump, oil chamber and piston for producing a smooth straight-line thrust with a definite length of stroke for the operation of clutches, brakes, valves, doors, etc.—have been announced by the General Electric Co., Schenectady, N. Y. The new line includes a complete range of standard models providing ten combinations of thrust and stroke ratings varying from 50 to 3,200 lb. thrust and from 2 to 16 in. stroke.

In the new Thrustor, according to the company, the impeller housing is stationary, a rigid shaft in ball bearings connecting the impeller to the motor. A number of a.c. or d.c. driving-motor arrangements are available, and all motors (except d.c. and single-phase motors on the 50-lb. size) are totally inclosed for protection against dirt and moisture. For single-phase service, capacitor motors are used where thrust ratings are 100 lb. or more. A special step-up gear train is provided for 25-cycle service to secure 60-cycle impeller speed. Slightly greater diameter impellers are employed for 50

cycles. Interchangeable base-plates are available for clevis or rigid mounting, and tilting as much as 45 deg. is permissible, as well as continuous operation with the piston in stalled position.

General Electric also offers a line of improved portable single-operator welding sets which it declares retain the proved characteristics of previous models and incorporate recently developed refinements. Self-stabilization is cited as the chief feature of the new welders, giving excellent performance throughout the entire welding range, using bare, lightly fluxed or heavily coated electrodes.

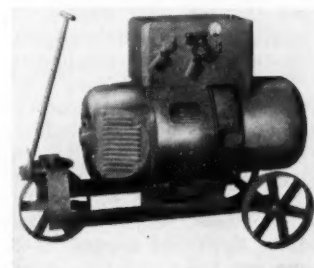


Type FA-6 Vacuum Switch, Showing Internal Arrangement

Other features of the new line (WD-30) are: self-contained construction without external reactors, resistors or separate exciters; separate controls for adjusting welding current and voltage located on a dead-front panel on top of the machine, which also carries a switch handle for reversing polarity and an instrument with selector switch for indicating current and voltage; excellent commutation at all current values; high operating efficiency; complete drip-proof construction; and a design which allows tipping to as much as 22 deg. off vertical.

A new heavily coated arc-welding electrode, bearing the designation Type W-23, is offered by General Electric for the economical production of high-speed high-quality welds in flat position. These electrodes are suitable for either manual or automatic welding with alternating or direct (reverse-polarity) current. Economy, according to the company, is due to the ability of the electrode to operate at higher speeds, in larger diameters (¼, ⅜ and ½ in.) and at higher current values, and also to the fact that the welds fuse uniformly with the side walls of the joint, thus saving the

General Electric WD-30 20-Hp. Portable Arc-Welding Set



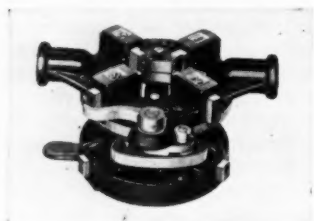
labor and time ordinarily spent in chipping out slag pockets. Smoothness, excellent appearance and exceptional tensile strength, density, ductility and resistance to impact and corrosion also are noted by the company.

General Electric also offers a new small vacuum switch made entirely of steel and designed, it is stated, to take advantage of the absence of an arc when breaking a circuit in a high vacuum. With an approximate diameter of $\frac{3}{4}$ in. and a length of $1\frac{1}{2}$ in., the switch is said to be capable of interrupting as much as 5 hp. as rapidly as thirty times per second. Rating of the switch (Type FA-6) is 10 amp., 250 volts d.c. or 440 volts a.c.; or 5 amp., 500 volts d.c. Construction features permit its use in almost any location, it is asserted, including those subject to severe shock and vibration.

Pipe Tools

Borden Co., Warren, Ohio, has added the Beaver No. 200 swivel pipe reamer and the Beaver Nos. 70 and 72 series die stocks to its line of pipe tools. Designed for $\frac{1}{4}$ - to 2-in. pipe, the following features of the reamer are stressed by the company: unbreakable handle and knob of high-grade malleable iron; heat-treated alloy-steel reamer head, which can be resharpened over and over and is replaceable when worn out; and simple swivel action.

Both $\frac{1}{4}$ - and 2-in. models of the Nos. 70 and 72 series die stocks in plain or ratchet types are available for threading iron,



steel, wrought-iron, brass, copper or aluminum pipe. Features noted by the company include: use of full-width dies—adjustable for cutting over- or under-size threads of standard length; die throwout, making it unnecessary to reset dies, insuring uniform threads and eliminating backing off over finished thread (being a non-leader-screw type of threader, repositioning of the die head is unnecessary); segmental-type dies, which can be sharpened over and over again (individual segments are interchangeable); dies ground for easy starting and pulling and, being exposed, provide ample



chip clearance and facilitate oiling; drip threads (or short nipples) can be cut in all sizes within the entire range of the equipment; each of dies (except the $\frac{1}{4}$ -in.) threads two sizes, thus reducing die-changing; dies available for right or left hand, American or British (Wentworth) standards.

Conveyors

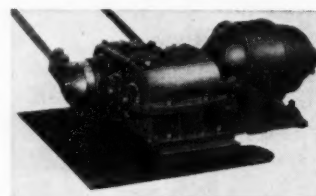
Wilmot Engineering Co., Hazleton, Pa., offers a new line of underground conveying equipment covering shaker chutes, chain conveyors for chambers, entries and faces and chain-type elevating conveyors and pit-car loading elevators. For shaker-chute operation, the company has developed the Type SC elliptical-gear drive, which it describes as operating on a very simple principle with a theoretically correct velocity principle. Through this principle, the uniform rotary motion of the motor is converted into an ideal reciprocating movement, according to the company, without the use of links, rocking levers, etc., thus decreasing shock, increasing efficiency and reducing maintenance and attendance to a minimum. Capacity of the equipment, available in either the double-arm underneath drive (Type SC-B) or the single-arm underneath or side-drive connection (Type SC-A), is 18 to 30 tons per hour. Height is $14\frac{1}{2}$ in.; width, 56 in.; and length, 43 in. Weight without motor is 2,000 lb. Strokes per minute vary from 85 to 95 and the length of stroke from 4 to 5 in.

Included in the list of chain-type elevating equipment is the Type ES semi-portable pit-car loader for taking coal from main conveyors and elevating it into cars. Length of the loader is 21 ft. $3\frac{1}{2}$ in., and clearance under the discharge is 6 ft. Traction wheels are provided for long moves, although it is not intended that this unit be moved frequently.

Elevating conveyors for conveying coal from lower to higher levels underground are available in the Type ES and Type EM models. The Type ES equipment is offered for applications where the capacity does not exceed 30-40 tons per hour and the length

does not exceed 150 ft. Under these conditions, the company states, $7\frac{1}{2}$ to 10 hp. is required for operation. Where the length is not over 40 to 50 ft., the unit can be driven from the tail end, which is equipped with a hopper loading section. Both goose-neck and straight discharge ends are available.

The Type EM elevating conveyor is recommended by the company for lengths up to 300 ft. and capacities not ex-



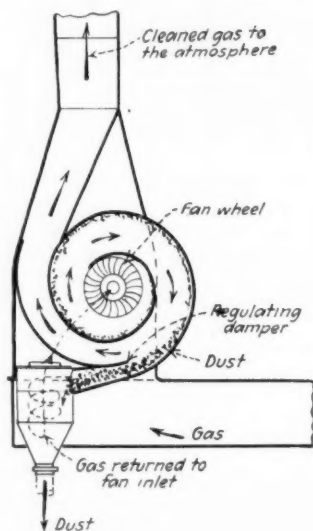
Wilmot Type SC-B Shaker-Chute Drive

ceeding 60 tons per hour, and has been applied, it is stated, on pitches up to 27 deg. Occasionally, two units in tandem have been used for a total length of over 500 ft. Features include: wearing strips; high flights to prevent the coal rolling back, which are attached so that they are pushed instead of pulled by the chain; and a method of attaching the power unit at the head end so that it remains level on pitches up to 25 deg.

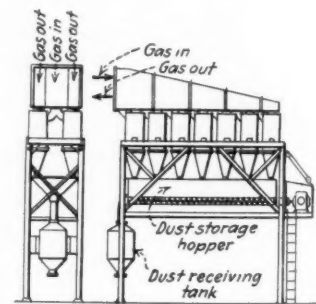
Dust Collection

Prat-Daniel Corporation, 350 Fifth Ave., New York, offers Thermix dust-collecting fans and Thermix multi-cyclone dust collectors for dust-collection service. The dust-collecting fan, according to the company, consists of a conoidal multi-blade fan with the scroll continued

Thermix Dust-Collecting Fan.



around the axis for an additional 180 deg. Dust is precipitated by centrifugal force along the elongated outside scroll sheet (equipped with wearing plates), separation occurring as in a highly efficient cyclone. The dust is removed by a skimmer opening within the scroll and parallel therewith, which withdraws the 10 to 15 per cent of gas containing the concentrated dust at the same velocity as the gas passing through the scroll, thus eliminating eddy currents which might, according to the company, interfere with the efficiency of separation. The gas bearing the concentrated dust passes to an auxiliary cyclone, where most of the dust is eliminated. The gas is then returned to the system inlet to afford a second opportunity for removing any dust which might have escaped the first time. This feature, according to the company, results in a marked increase in efficiency and requires no auxiliary power. Another feature cited by the makers is the fact that the fan can be operated to skim off a thicker slice of gas at low rating, thus affording practically constant dust-collecting efficiency at all ratings.



Thermix Multi-cyclone Dust Collector.

The multi-cyclone collector consists of a number of moderate-sized cyclones in parallel-flow batteries. Each cyclone is controlled by a damper, so that, as the gas rating fluctuates within certain limits, the number in operation is raised or lowered, thus maintaining dust collection, it is said, at the point of maximum efficiency. With a single large cyclone capable of handling the maximum volume of gas, a reduction in gas quantity and velocity, it is pointed out, would reduce the centrifugal force on which separation depends and thereby lower the efficiency at less-than-maximum ratings. Opening and closing of dampers to cut individual cyclones in and out of the circuit is controlled automatically. This design also allows considerable latitude in the arrangement of the cyclones to fit space limitations.